DOMAIN NAME SYSTEM

Security Checklist

Version 3, Release 1

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Developed by DISA for the DoD

Unclassified UNTIL FILLED IN

CIRCLE ONE

FOR OFFICIAL USE ONLY (mark each page)

CONFIDENTIAL and SECRET (mark each page and each finding)

Classification is based on classification of system reviewed:

Unclassified System = FOUO Checklist
Confidential System = CONFIDENTIAL Checklist
Secret System = SECRET Checklist
Top Secret System = SECRET Checklist

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1. INTRODUCTION

This document contains procedures that enable qualified personnel to conduct Domain Name System (DNS) certification or Compliance Validation reviews, or a site self assessment. The DNS review assesses an organization's compliance with the DNS Security Technical Implementation Guidance (STIG). DISA Field Security Operations (FSO) conducts Certification reviews, Security Test and & Evaluation, and Enhanced Compliance Validations to provide DISA, Combatant Commands, and other Department of Defense (DoD) agencies and organizations with a level of confidence that their DNS servers and infrastructure are secure and can adequately support their mission.

1.1 Scope of a Review

The primary objective of a DNS review is to examine the site's administrative practices, name servers, and the zones these name servers support. The review should cover not only the authoritative name servers, but all supporting name servers as well. In some cases, this may not be feasible (e.g., the name server is remotely located), however, if any server supporting a zone is not assessed, this should be clearly documented in the final assessment report.

Organizations may also have several caching name servers – i.e., servers that can resolve client queries, but which are not authoritative for any DNS records. These are the servers that are listed in the DNS configuration of the computers on the internal network. A DNS review should also evaluate all of the organization's caching name servers, but a sample may suffice if there are resource or time constraints.

Client DNS configuration is outside the scope of the review, which focuses on DNS servers and related administrative, technical and physical controls.

1.2 Organization of the Checklist

This checklist is arranged by asset posture. The first section is dedicated to the Non-Computing Asset posture of DNS Policy. These checks/requirements need only be performed once for the site as they apply to all DNS servers and the DNS architecture, regardless of platform or function. The finding status should be updated if a change takes place on the system, during a yearly accreditation visit if vulnerabilities are identified, or during a self assessment. The remaining sections focus on the computing asset posture of the type of DNS software running on the platform: All DNS servers, BIND, Windows DNS, or CISCO CSS.

- Section 2: Non-Computing DNS Policy
- Section 3: All DNS servers
- Section 4: BIND servers, both UNIX and Windows operating system platforms
- Section 5: Windows DNS Server
- Section 6: CISCO CSS DNS

1.3 VMS Procedures

When conducting a DNS Review, the Team Lead and the assigned Reviewer identify security deficiencies, provide data from which to predict the effectiveness of proposed or implemented security measures associated with the DNS system and operating environment. Security Reviews of a DoD DNS system requires that the results of the review be tracked using the VMS database. The Team Lead begins by completing both the Visit and the Visit Summary forms under the appropriate Organization in VMS. During a site review, Reviewers update findings for a requested set of site assets. Reviewers enter findings in VMS by updating the same compliance status screens used by the site's System Administrators (SAs). For DNS assets, Reviewers will update assets and findings manually using the VMS screen (or the MERT tool) rather than using an XML script (until such time that a script is written). When the Reviewer is finished updating the finding results associated with each asset, the Team Lead will compile an executive summary, finalize the Visit information screen in VMS, and request visit approval. Following a review, the Team Lead reports the results back to the appropriate parties. After reviewing the results of the Visit, the site can then access VMS to provide any required approvals, or POA&M updates.

1.3.1 Registering and Managing DNS Assets

In VMS, an asset is defined as a hardware device or an operating system image that hosts an application (or workload) that is accessed by more than one user. An asset may also include physical locations or other non-computing assets, such as a DNS Policy. Unclassified asset components are registered in VMS via the NIPRNet and confidential or secret asset components are registered via the SIPRNet. Both the Reviewer and the SA will create, maintain, and track assets in VMS. The reviewer will use the Asset and Finding Maintenance screen to perform these functions. The SA will use the By Location navigation chain to perform the same function. When Reviewers access the Asset and Finding Maintenance screen, the Navigation pane displays a white Visits folder. Expand this Visits folder to display its subfolders. Each subfolder represents an individual visit in VMS that has been assigned for review. Click (+) to expand the visit and display the location summaries for the visit. Within the location, DNS assets are tracked using one of the following asset types.

- Computing – Assets which have an OS such as a DNS server or appliance type device.
- Non-Computing – Used for registering DNS policy checks which are overall process and procedure checks as well as architectural requirements for the DNS infrastructure as a whole.

Assets are also listed according to the following categories.

Must Review – Assets that must be reviewed (also marked with a red exclamation point).
Reviewed – Site assets modified by the Reviewer
Not Selected for Review – Other site assets that were not targeted for review

NOTE: If you save changes to assets or findings in the Must Review area, VMS will automatically flag those assets as reviewed and move them to the Reviewed area.

The asset icon color in the Navigation pane indicates the severity of an open finding for the asset. The cubes on the right describe what each of the colors signifies.

- Red – CAT I
- Orange CAT II
- Yellow – CAT III
- Light Green CAT IV
- Dark Green – No open or not reviewed items.

1.3.1.1 Creating Non-Computing DNS Policy Assets

To create a DNS Policy **Non-Computing** asset, perform the following steps.
1. Expand Asset Findings Maintenance.
2. Click Assets/Findings.
3. Reviewer Only: Expand Visits and skip to Step 5.
4. SA only: Expand Location then the required organization. Then skip to Step 7.
5. Reviewer Only: Expand the sub-folder you are assigned. Each subfolder represents an individual visit in VMS that has been assigned for your review. If the Visit is not visible, you have not been designated at the visit level as a reviewer. See your Team Lead.
6. Reviewer Only: Expand the visit and display the location summaries for the visit.
7. Click the Create icon located next to Non-Computing. The asset form is displayed.
8. Click the General tab and enter information into all required fields
- Host Name – This must be unique for the site (e.g. DISA HQ DNS Policy)
- Managed By – use for remote locations being managed.
- Owner Field – use to register asset to parent or child location.
- Mac level, Confidentiality, and Use – change or verify default values as required.

NOTE: The Asset Identification tab is not used for Non-Computing assets.

9. Click the Asset Posture tab to add functions to the asset.
- Expand Non-Computing then click on DNS Policy
- Click the >> button to the selected option(s) to the Selected window
- Click Save

1.3.1.2 Creating Computing DNS Assets

To create a DNS Computing asset, perform the following steps.
1. Expand Asset Findings Maintenance.
2. Click Assets/Findings.
3. Reviewer Only: Expand Visits and skip to Step 5.
4. SA only: Expand Location then the required organization. Then skip to Step 7.
5. Reviewer Only: Expand the sub-folder you are assigned. Each subfolder represents an individual visit in VMS that has been assigned for your review. If the Visit is not visible, you have not been designated at the visit level as a reviewer. See your Team Lead.
6. Reviewer Only: Expand the visit and display the location summaries for the visit.
7. Click the Create icon located next to Computing. The asset form is displayed.

8. Click the General tab and enter information into all required fields
- Host Name
- Managed By – use for remote locations being managed.
- Owner Field – use to register asset to parent or child location.
- Mac level, Confidentiality, and Use – change or verify default values as required.
- Status – select Online or Offline
9. Click the Asset Identification tab
- Enter IP address and click Add
- Enter the MAC address and then click Add
10. Click the Asset Posture tab. In the Available pane, expand Computing and drill down to select the following functions:
- Operating System – drill down to required selection
- Role – drill down to required selection
- Application, DNS Applications, select the DNS application type (i.e. BIND, Windows DNS, CISCO CSS DNS)
- Click the >> button to the selected option(s) to the Selected window
- Click Save

1.3.1.3 Asset Finding Maintenance

As part of the DNS review process, Reviewers enter findings manually into VMS as follows.
1. Expand Asset Findings Maintenance.
2. Expand Assets/Findings
3. Expand Visits to display its sub-folders. *(Reviewer Only SA will expand Location and proceed to step 6.*
4. Expand the sub-folder you are assigned. Each subfolder represents an individual visit in VMS that has been assigned for your review.
5. Expand the visit and display the location summaries for the visit.
6. Expand either Computing or Non-Computing depending on the asset type registration.
7. Expand Must Review *(Reviewer Only. SA will not see 'Must Review', but will proceed to step*
8. Expand Asset to Review. Ready to review is colored in RED
9. Expand the asset and then each Vulnerability Key.
10. Update the 'Status' of the vulnerability
11. Identify details on all open vulnerabilities
12. If applicable: Apply the same Status and comments to other assets by using the 'apply to other Findings' pane.

1.3.1.4 Verify All Required Assets are Updated

1. Asset Findings Maintenance
2. Visits
3. Expand visit
4. Expand CCSD
5. Expand location
6. Expand computing or non-computing as applicable.

7. Expand Must Review. Verify checkmarks are gone from all vulnerabilities, indicating the asset is updated/reviewed.
8. If checkmarks remain from previous step, update findings using the procedures for Updating SRR Findings to VMS procedures given in a previous subsection.

1.3.2 Printing Compliance and Summary Reports

Compliance and summary reports can be helpful in preparing for an SRR or for SAs in tracking and monitoring findings status.

1.3.2.1 VC06 Asset Compliance Report

1. Navigate to the Reports Menu and select the VC06 report.
2. Select to do the report by asset or an by organization as needed
3. Select “open” status
4. Sort on desired fields as required
5. Select the following to Display
- Finding Comments
- Finding Long Name
- Because it’s truncated otherwise
- Finding Details
- Vulnerability Discussion

1.3.2.2 VC03 Severity Summary Report

Same steps as above but the report will give only the vulnerability numbers, which match the criteria selected. These reports can provide a quick check of status.

1.3.2.3 ASO1 Report

The AS01 report assists the reviewer or SA by quickly identifying the assets at the location the review is being performed. In the section “Looking at Network Assets” is a quick step by step instruction in creating the report. The site may want to do other reports, if your site manages or owns assets, which are not located at the site. Check Child Locations if applicable. Navigate to the Reports menu, Select the AS01 Report, and select the desired criteria for the report.

1.3.2.4 VL03 Report

The VL03 report assists the reviewer or SA by quickly identifying the IAVMs that will be identified to the asset when you select the operating system of the asset. Navigate to the Reports menu, Select the VL03 Report, and select the desired criteria for the report.

2. DNS POLICY CHECKS – APPLIES TO ALL DNS ARCHITECTURES

The following checks apply to the non-computing vulnerabilities tied to DNS architectures.

Vulnerability Key: V0013032

STIG ID: DNS0100

Vulnerability: A caching name server is not protected by equivalent or better physical access controls than the clients it supports.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
If an adversary can compromise a name server, then the adversary can redirect most network traffic sent to the hosts defined on that name server. Therefore, the security of the name server is as critical as the security of the hosts it protects. It is understood that different hosts require different levels of physical security. Nevertheless, the name server should not have weaker physical access controls than the computers it supports because this would, in effect, reduce the security of those hosts as well.

Check: DNS0100
Ask to see the locations at the facility where computers supported by the listed name server(s) under evaluation are located (e.g., server closets, raised floor space, etc.). Note those areas that have the most extensive physical security controls. Also ask to see the locations of the name servers themselves. Then compare the physical security of the most secure computers against the physical security of the name server under evaluation. If the name server has substantially weaker physical security controls than the hosts it supports (e.g., the name server is in the DNS administrator's cube while the servers are in a locked cage in a secure raised floor area), then this is a finding.

Fix: DNS0100
Working with appropriate technology and facility personnel, the IAO should arrange to relocate the name server into the same physical location as the most sensitive hosts it supports.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0013033

STIG ID: DNS0105

Vulnerability: An authoritative name server is not protected by equivalent or better physical access controls than each of the hosts in its zone.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 5.9 Device Locations

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
If an adversary can compromise a name server, then the adversary can redirect most network traffic sent to the hosts defined on that name server. Therefore, the security of the name server is as critical as the security of the hosts it protects. It is understood that different hosts require different levels of physical security. Nevertheless, the name server should not have weaker physical access controls than the computers it supports because this would, in effect, reduce the security of those hosts as well.

Check: DNS0105
Ask to see the locations at the facility where computers supported by the listed name server(s) under evaluation are located (e.g., server closets, raised floor space, etc.). Note those areas that have the most extensive physical security controls. Also ask to see the locations of the name servers themselves. Then compare the physical security of the most secure computers against the physical security of the name server under evaluation. If the name server has substantially weaker physical security controls than the hosts it supports (e.g., the name server is in the DNS administrator's cube while the servers are in a locked cage in a secure raised floor area), then this is a finding.

Fix: DNS0105
Working with appropriate technology and facility personnel, the IAO should arrange to relocate the name server into the same physical location as the most sensitive hosts it supports.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0013034

STIG ID: DNS0110

Vulnerability: The DNS log archival requirements do not meet or exceed the log archival requirements of the operating system on which the DNS software resides.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 10.2 Content Configuration

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
Name servers are dedicated to the DNS function and, as a result, the most critical security and operations events on those name servers will appear in the DNS logs. Different sites may have different policies regarding archival, but the DNS logs should be maintained in an equivalent (or better) manner as the operating system logs. Therefore, if operating system logs are stored for a year, then DNS logs should be stored for at least a year. If operating system logs are written to read-only media, then the DNS logs should be written to read-only media as well.

Check: DNS0110
This check is only applicable if DNS logs are independent from system logs. If the log archival scheme for the DNS logs is weaker than the one for the system logs, then this is a finding.

Fix: DNS0110
Working with appropriate technical and facility personnel, the IAO should implement an archival strategy that is at least as extensive as the current archival operation for operating system logs.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0013035

STIG ID: DNS0115

Vulnerability: DNS logs are not reviewed daily or a real-time log analysis or network management tool is not employed to immediately alert an administrator of critical DNS system messages.

IA Controls: ECAT-1 Audit Trail, Monitoring, Analysis and Reporting
ECSC-1 Security Configuration Compliance

Categories: 10.3 Review

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
If a responsible administrator does not review DNS logs daily, then there is the potential that an attack or other security issue can go unnoticed for a day or more, which is unacceptable in DoD environments.

Check: DNS0115
If reviewing of logs is anything less than daily, then this is a finding. In many cases, DNS logs are included within the system logs. If this is the case, then daily review of the system logs meets the requirement. If the site employs special software to scan logs for special events or key words, then this is also acceptable so long as the system issues real time alerts or is monitored at least daily.

Fix: DNS0115
DNS software administrators should commit to reviewing logs daily, perhaps establishing a rotation for this purpose to ensure that days are not missed. Having a primary administrator and backup administrators rotate this responsibility will prevent a problem or warning sign from being missed because of an error in judgment.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0013036

STIG ID: DNS0120

Vulnerability: A list of personnel authorized to administer each zone and name server is not maintained.

IA Controls: ECSC-1 Security Configuration Compliance
PRMP-1 Maintenance Personnel
PRMP-2 Maintenance Personnel

Categories: 12.4 CM Process

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category IV

Vulnerability Discussion:
If an organization does not document who is responsible for the DNS function, then there is a significant potential that unauthorized individuals will obtain privileged access to name servers. During a security breach, it will be difficult to assign accountability for improper transactions if it is not known who is responsible for this function.

Check: DNS0120
If the site POC cannot produce a list of personnel authorized to administer each zone and name server, then this is a finding.

Fix: DNS0120
The IAO must create and maintain a list of authorized DNS administrators for each zone and name server under the IAOs scope of responsibility.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0013314

STIG ID: DNS0125

Vulnerability: A zone or name server does not have a backup administrator.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: Information Assurance Officer

Reference: DNS STIG

Severity: Category II

Vulnerability Discussion:
If there is no backup DNS administrator, then there is nobody to assist during a security emergency when the primary administrator is unavailable. In some cases, a backup administrator can also detect problems introduced by the first administrator before these problems are allowed to propagate. Personnel redundancy is as important as technology redundancy for the DNS availability.

Check:
DNS0125 (Manual)
If the site POC cannot produce a list of backup personnel authorized to administer each zone and name server, then this is a finding. If any zone or name server has only one DNS database administrator or only one DNS software administrator, then this is a finding. If there is not a backup administrator for both roles, then this is a finding.

Fixes
DNS0125 (Manual)
Working with appropriate resource managers, the IAO should identify a backup DNS administrator for each zone and name server under the IAOs scope of responsibility.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0013037

STIG ID: DNS0130

Vulnerability: A patch and DNS software upgrade log; to include the identity of the administrator and time each patch or upgrade was implemented, is not maintained.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 10.1 Procedures

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
DNS software has a history of vulnerabilities and new ones may be discovered at any time. To ensure that attackers cannot take advantage of known DNS vulnerabilities, applicable software patches must be applied. Patch and DNS software upgrade documentation must be maintained to ensure the DNS name servers are protected from these vulnerabilities and current with required patches and software upgrades.

Check: DNS0130
DNS patch and upgrade change records must include records of the date and time each patch or upgrade to DNS software was implemented, and by whom. The method of verification may be considered weak, but the requirement is merely to document the dates and times of DNS software patch and upgrades.

Instruction: If there is no patch and upgrade log, then this is a finding. If there is such a log, then entries must include the date and time of any change as well as the identity of the administrator. Failure to include this information for any entry is a finding.

Fix: DNS0130
The SA should establish and maintain a log of the date and time each patch and upgrade to DNS software was implemented.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0013038

STIG ID: DNS0135

Vulnerability: Operating procedures do not require that DNS configuration, keys, zones, and resource record data are backed up on any day on which there are changes.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 13.4 Backup & Recovery

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
If a name server's configuration, keys, zones, and resource record information are not backed up on any day in which there are changes, there is a risk that an organization cannot quickly recover from the loss of the server. In addition, forensic analysis of security incidents is considerably more difficult if there is not reliable evidence of when changes may have occurred.

Check: DNS0135
Fortunately, by design, the DNS architecture provides built-in redundancy support. There should always be a hot backup of zone information present whenever the primary name server is unavailable for any reason (i.e., the authoritative slave server maintains a copy of the zone files on the master). This built-in redundancy, however, does not extend to configuration files and logs. Therefore, name servers should be backed up to an external media (e.g., tape, optical disk, etc.) on a regular basis.

At some locations, an automated enterprise backup system supports many servers. In this case, name servers can simply be added to the enterprise system. At other locations, backups must be performed manually, placing a considerably higher burden on administrators. In circumstances in which zone and configuration information is very static, remaining the same for several months at a time, it would make little sense to conduct daily full backups. Backups should occur as frequently as needed to capture changes on the name server.

If there are no written procedures for the backup of name servers, then this is a finding. Backup in this context refers to copying the name server's DNS configuration, keys, zones, and resource record data, at a minimum, in case it is needed for recovery at a later time. A full file system backup of the name server is preferred.

If there are written backup procedures, then it must call for the backup of DNS configuration, keys, zones, and resource record data on any day in which they were modified, if this is not the case, then this is a finding.

Any traditional daily tape backup scheme – whether it involves a full, incremental or differential scheme – will satisfy the requirement. Less frequent backups will also suffice if the configuration and resource record data are backed up whenever they are modified.

Fix: DNS0135
The IAO will establish operating procedures that will ensure that, at a minimum, DNS configuration, keys, zones, and resource record data is backed up on any day on which there are changes.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0013039

STIG ID: DNS0140

Vulnerability: Configuration change logs and justification for changes are not maintained.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 12.9 Documentation

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
If changes are made to the configuration without documentation, it is often difficult to determine the root cause of an operational problem or understand the circumstances in which a security breach occurred. Without adequate configuration change records, it is also more difficult for the IAO and other oversight personnel to track major activity, which is critical to information assurance.

Check: DNS0140
The DNS configuration change log must note the date and time any DNS configuration files were modified and the business justification for that modification. Unless the business justification is routinely so vague as to be meaningless (e.g., "user request" for every entry), the reviewer should not second-guess what constitutes an acceptable business rationale.

Instruction: If there is no configuration change log, then this is a finding. If there are such records, then entries must include the date and time of any change and the business rationale for the change. Failure to include this information for any entry is a finding.

Fix: DNS0140
The IAO should implement, maintain, and periodically check compliance with configuration management requirements. The configuration change log should include, at a minimum, the date and time of any modifications to the DNS configuration files and the business justification for that modification.

Comments:

Vulnerability Key: V0013040

STIG ID: DNS0145

Vulnerability: Written procedures for the replacement of cryptographic keys used to secure DNS transactions do not exist.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 8.4 Key Management

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
Without adequate TSIG supersession procedures, there is the potential that an unauthorized person may be able to compromise the key. Once in possession of the key, that individual might be able to update DNS records by configuring a machine to masquerade as a zone partner. Since name servers are configured to accept updates signed by a valid key, there may be no other administrative or technical controls to prevent this type of security breach.

Check: DNS0145
Like user account passwords, cryptographic keys such as TSIG keys must be changed periodically to minimize the probability that they will be compromised. If there is a known compromise of a TSIG key, then it needs to be replaced immediately. One of the most important aspects of key supersession is the method that will be used to transfer newly generated keys. Possibilities, in rough order of preference, are as follows:

- SSH
- Encrypted e-mail using DoD PKI certificates
- Secure fax (STU-III)
- Regular mail (using the expedited mailing service holding the current GSA contract for "small package overnight delivery service")
- Hand courier

Instruction: If there are no procedures for TSIG key supersession, then this is a finding. If there are such procedures, then it must cover the following:

- Frequency of key supersession
- Criteria for triggering emergency supersession events
- Notification of relevant personnel during emergency and non-emergency supersession
- Methods for securely transferring newly generated keys

This is a finding if any of these elements are missing from the supersession procedures.

Fix: DNS0145
The IAO should establish standard operating procedures for TSIG key supersession. These procedures should include, at a minimum, frequency of key supersession, criteria for triggering emergency supersession events, notification of relevant personnel during emergency and non-emergency supersession, and methods for securely transferring newly generated keys.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0013041

STIG ID: DNS0150

Vulnerability: The IAO has not established written procedures for the process of updating zone records, who is authorized to submit and approve update requests, how the DNS administrator verifies the identity of the person from whom he/she received the request, and how the DNS administrator documents any changes made.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 12.4 CM Process

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
If the procedures for updating zone records are inadequate, then this increases the probability that an adversary perhaps even an insider will be able to modify the DNS records using weaknesses in administrative processes rather than weaknesses in technical controls.

Check: DNS0150
To best assure the integrity of zone files, one must not only carefully manage the manner in which requests are processed but also periodically check that the current records are valid. For example, when equipment is retired, people often fail to remove the associated host from the DNS. Without periodic checks, an attacker may use a retired host IP address to obtain valuable information from another user who was unaware of the change.

Instruction: If there are no written procedures for manual updates of zone files (e.g., a new host entry), then this is a finding. If there are such procedures, then it must cover the following:

- The process for updating zone records
- Who is authorized to submit and approve update requests
- How the DNS database administrator verifies the identity of the person from whom he or she received the request
- How the DNS database administrator documents any changes made

This is a finding if any of these elements are missing from the procedures for manually updating zone records.

Fix: DNS0150

The IAO should establish standard operating procedures for updating zone records. These procedures should include, at a minimum, the process for updating zone records, who is authorized to submit and approve update requests, how the DNS database administrator verifies the identity of the person from whom he or she received the request, and how the DNS database administrator documents any changes made.

Comments:

Vulnerability Key: V0013050

STIG ID: DNS0160

Vulnerability: The DNS architecture is not documented to include specific roles for each DNS server, the security controls in place, and what networks are able to query each server.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS; 12.9 Documentation

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
Without current and accurate documentation, any changes to the network infrastructure may jeopardize the network's integrity. To assist in the management, auditing, and security of the network, facility drawings and topology maps are a necessity; and those addressing critical network assets, such as the DNS server, are especially important. Topology maps (documentation) are important because they show the overall layout of the network infrastructure and where devices are physically located. They also show the relationship and inter-connectivity between devices and where possible intrusive attacks (wire taps) could take place. Additionally, documentation along with diagrams of the network topology are required to be submitted to the Connection Approval Process (CAP) for approval to connect to the NIPRNet or SIPRNet. Depending on the command, service, or activity, additional approval may be required.

Check: DNS0160
Interview the IAO or SA and ask to see the DNS architecture documentation to include roles for each server, security controls, and the list of networks that are able to query the DNS server.

Fix: DNS0160
Document the DNS architecture to include the location, function, role, and security controls for all DNS servers.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0013313\

STIG ID: DNS0170

Vulnerability: The underlying operating system of the DNS server is not in compliance with the appropriate OS STIG.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 12.4 CM Process

Responsibility: System Administrator

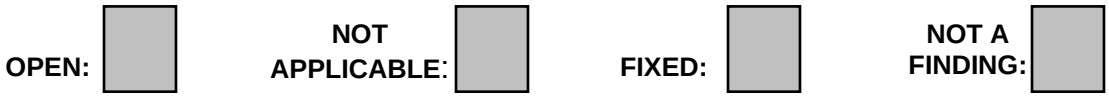
References: DNS STIG

Severity: Category II

Vulnerability Discussion:
A vulnerability in the underlying operating system of a DNS server could potentially impact not only the DNS server but the entire network infrastructure to include the Global Information Grid (GIG).

Checks: DNS0170
Review the Operating System against the appropriate OS STIG. For a Windows system this would mean an evaluation with the Gold Disk; for a UNIX/LINUX system this would mean an evaluation using the SRR scripts. STIG compliance means that all findings are either closed, or there is a POA&M to address any outstanding vulnerabilities.

Fixes: DNS0170
The underlying Operating System of the DNS server must be in compliance with the appropriate OS STIG.



Comments:

Vulnerability Key: V0013051

STIG ID: DNS0175

Vulnerability: The DNS server software is either installed on or enabled on an operating system that is no longer supported by the vendor.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 12.8 Unsupported Vendor Products

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category I

Vulnerability Discussion:

Check: DNS0175
Review the Operating System to determine if it is supported by the vendor, e.g. Windows NT is no longer supported.

Fix: DNS0175
The IAO should develop a migration plan to upgrade or replace any out of date software or any software that is no longer vendor supported.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0013053

STIG ID: DNS0185

Vulnerability: The contents of zones are not reviewed at least annually.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
DNS administrators must review the contents of their zones at least annually for content or aggregation of content that may provide an adversary information that can potentially compromise operational security. This specifically includes names that provide an outsider some indication as to the function of the referenced system unless the function is obvious in the context of other standard DNS information (e.g., naming a DNS server as dns.zone.mil or an SMTP mail server as mail.zone.mil is not an OPSEC violation given that the functions of these servers are easily identifiable during DNS queries). The DNS administrator is the final adjudicator of the sensitivity of DNS information, in concert with the OPSEC processes of the organization, but should make a conscious decision to include such information based on operational need. NIST guidance includes specific guidelines that HINFO, RP and LOC records not be included in the zone.

Check: DNS0185
Interview the DNS administrator and ask if there is a procedure in place to review and validate the contents of the zones he/she is responsible for, at least annually.

Fix: DNS0185
The IAO will ensure the DNS administrator reviews the contents of the zones they are responsible for, at least annually.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: **V0013052**

STIG ID: DNS0190

Vulnerability: The SA has not subscribed to ISC's mailing list "bind announce" for updates on vulnerabilities and software notifications.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 3.1 Security Patches

Responsibility: System Administrator

References: DNS STIG

Severity: Category IV

Vulnerability Discussion:
Whether running the latest version of software or an earlier version, the administrator should be aware of the vulnerabilities, exploits, security fixes, and patches for the version that is in operation in the enterprise.

Check: DNS0190
If the site is using BIND, interview the SA to determine if they have subscribed to ISC's mailing list called "bind-announce" (information on the Internet at http://www.isc.org/sw/bind/bind-lists.php) for vulnerabilities and software notifications.

Fix: DNS0190
If BIND is utilized, the SA will subscribe to ISC's mailing list called "bind-announce" (information on the Internet at http://www.isc.org/sw/bind/bind-lists.php) for vulnerabilities and software notifications.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0013042

STIG ID: DNS0200

Vulnerability: An authoritative master name server does not have at least one and preferably two or more active slave servers for each of its zones. The slave server does not reside on a separate host and is not geographically dispersed.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category I

Vulnerability Discussion:
A critical component of securing an information system is ensuring its availability. The best way to ensure availability is to eliminate any single point of failure in the system itself and in the network architecture that supports it. Fortunately, the inherent design of DNS supports a high-availability environment. Master and slave servers regularly communicate zone information, so if any name server is disabled at any time, another can immediately provide the same service. The task for the network architect is to ensure that a disaster or outage cannot simultaneously impact both the master and all of its slave servers. If a disaster occurs, the DNS protocols cannot prevent total loss of name resolution services for hosts within affected zones.

Check: DNS0200
Using the name server configuration files, identify any zone that does not have a slave. An authoritative server for each zone must have a slave name server. If this is not the case, then this is a finding. If the slave server does not reside on a separate host, this is a finding.

Fix: DNS0200
The IAO must work with appropriate personnel to obtain and configure another name server to act as a slave to the server hosting this zone.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0013043

STIG ID: DNS0205

Vulnerability: Name servers authoritative for a zone are not located on separate network segments if the servers described in the zone are themselves located across more than one network segment.

IA Controls: CODB-3 Data Back-up Procedures
ECSC-1 Security Configuration Compliance

Categories: 13.5 Redundancy

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category I

Vulnerability Discussion:
A critical component of securing an information system is ensuring its availability. The best way to ensure availability is to eliminate any single point of failure in the system itself and in the network architecture that supports it. Fortunately, the inherent design of DNS supports a high-availability environment. Master and slave servers regularly communicate zone information, so if any name server is disabled at any time, another can immediately provide the same service. The task for the network architect is to ensure that a disaster or outage cannot simultaneously impact both the master and all of its slave servers. If a disaster occurs, the DNS protocols cannot prevent total loss of name resolution services for hosts within affected zones. The solution is to disperse name servers in such a way as to avoid single points of failure. At minimum, authoritative name servers for the same zone should be on different network segments in order that at least one name server is available in the event that a router or switch fails. This fault tolerance should also extend to wide area data communications lines. For example, if a site has multiple leased lines connecting the network on which the name server resides to a larger network such as the NIPRNet, routing protocols should be configured such that if one of the lines fails, another one will still be available to support the name server.

Check: DNS0205
Determine whether all the name servers supporting the same zone reside on the same subnet. If they are, this is a finding.

The reviewer can manually check the IP addresses of the servers being reviewed to determine if they are on the same subnet.

Fix: DNS0205

Working with appropriate technology and facility personnel, the IAO should arrange to relocate one of the name servers so that it resides on a different network segment than any other name server that hosts one or more of the same zones. In cases where the zones are small and not subject to frequent change, consideration should be given to the use of hosts or lmhost files to resolve host names.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0013044

STIG ID: DNS0210

Vulnerability: Name servers are not geographically distributed.

IA Controls: COAS-1 Alternate Site Designation
COAS-2 Alternate Site Designation
ECSC-1 Security Configuration Compliance

Categories: 13.5 Redundancy

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
When authoritative name servers are co-located in the same facility, the loss of the facility likely leads to the loss of access to all servers defined in their zones (i.e., nobody can resolve their names). If one or more of the hosts in the supported zones are located at a different site, they would be effectively down even though they would otherwise be fully operational. This scenario can only be prevented with geographic dispersal of name servers.

Check: DNS0210
By examining the zone file, the reviewer can determine whether there are hosts defined on one of the name server's zones that reside in more than one building. If they all reside in the same building, then this check does not apply. If the defined hosts reside in different buildings, then one of the evaluated name server's zone partners (slave or master) must reside in an alternate building. In this case, if all of the authoritative name servers for a zone reside in the same building, then this a finding.

Fix: DNS0210
Working with DNS administrators and appropriate technical and facility personnel, the IAO should either arrange for one of the existing name servers to be moved to a different location, deploy an additional name server at another location, or arrange to have an existing name server at another location act as slave to the zones hosted at the current location.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0013045

STIG ID: DNS0215

Vulnerability: Private IP space is used within an Enclave without the use of split DNS to prevent private IPs from leaking into the public DNS system.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
DNS operators should assume that any data placed in the DNS would be available to anyone connected to the Internet. Split DNS shall not be considered a mitigating factor or technique to deny DNS information to an attacker. Split DNS will continue to be required in one situation only: to prevent address space that is private (e.g., 10.0.0.0/24) or is otherwise concealed by some form of Network Address Translation from leaking into the public DNS system.

Check: DNS0215
This check is only applicable if the site is using private IP space within the Enclave. This is typically encountered when a site is using Network Address Translation (NAT) with private or non-routable IPs.

This configuration should be evidenced by the use of the view statement in the named.conf file. If it is not, then the DNS administrator must satisfactorily explain how an alternative mechanism achieves the same effect. If the site employs NAT and a split DNS configuration is not employed or a satisfactory alternative mechanism is not employed, then this is a finding. The objective is that an external DNS client should have no means of querying the DNS to obtain a host-to-IP-address mapping for an internal host that has a private or non-routable IP.

Fix: DNS0215
The IAO will ensure, when using private IP address space within an Enclave, that a split-DNS configuration is implemented to prevent the private address space from leaking into the public DNS system.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0013046

STIG ID: DNS0220

Vulnerability: The DNS database administrator has not documented the owner of each zone (or group of related records) and the date the zone was created, last modified, or verified. This documentation will preferably reside in the zone file itself through comments, but if this is not feasible, the DNS database administrator will maintain a separate database for this purpose.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS; 10.2 Content Configuration

Responsibility: System Administrator

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
A zone file should contain adequate documentation that would allow an IAO or newly assigned administrator to quickly learn the scope and structure of that zone. In particular, each record (or related set of records, such as a group of LAN workstations) should be accompanied by a notation of the date the record was created, modified, or validated and record the owner's name, title, and organizational affiliation. The owner of a record is an individual with the authority to request that the record be modified or deleted. If an organization cannot identify who is responsible for a host record, then there is no assurance that it is valid. If invalid records are in a zone, then an adversary could potentially use their existence for improper purposes.

Check: DNS0220
DNS zone record documentation will preferably reside in the zone file itself through comments, but if this is not feasible, the DNS database administrator will maintain a separate database for this purpose.

Review the zone files. If the records are not fully documented, then this is a finding. The zone record documentation is to include, at a minimum:

- The owner of each zone record
- The date the zone record was created
- The date the zone record was last modified
- The date the zone record was last verified

Records can be grouped (e.g., a number of workstations residing in the same area or a high-availability server cluster)

Fix: DNS0220
The DNS database administrator will document, at a minimum, the owner of each zone record (or group of related records) and the date the record was created, last modified, or verified. This documentation will preferably reside in the zone file itself through comments, but if this is not feasible, the DNS database administrator will maintain a separate database for this purpose.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0013047

STIG ID: DNS0400

Vulnerability: The name server software on production name servers is not BIND, Windows 2000 or later DNS, or alternatives with equivalent security functionality and support, configured in a manner to satisfy the general security requirements listed in the STIG. The only currently approved alternative is CISCO CSS DNS.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
If an organization runs DNS name server software other than BIND, Windows 2000 DNS or later, or an equivalent alternative, it cannot benefit from assurance testing of those implementations of DNS. As a result, there may be unknown vulnerabilities associated with the alternative products for which there are no compensating controls. Moreover, there is no detailed security implementation guidance for other name server implementations, which makes it considerably harder to conduct reviews or self assessments. An incomplete review means that an organization operates at a lower level of assurance than could have been realized with one of the approved products.

Check: DNS0400
Review the DNS name server software on the platform to determine what DNS software is running. If the name server is running a DNS implementation other than ISC BIND, Windows 2000/2003 or later DNS, or equivalent DNS software, then this is a finding.

The only alternative currently approved is Cisco CSS DNS, which is limited to only those hosts defined in the csd.disa.mil domain. CSS DNS is subject both to these general security requirements, where applicable, and the specific STIG guidance for this product.

Fix: DNS0400
Working with DNS software administrators and other appropriate technical personnel, the IAO should oversee a migration to an approved name server software.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0013048

STIG ID: DNS0405

Vulnerability: Hosts outside an enclave can directly query or request a zone transfer from a name server that resides on the internal network (i.e., not in a DMZ).

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: Information Assurance Officer

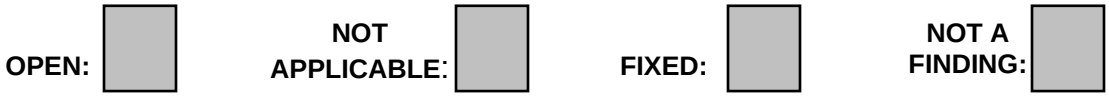
References: DNS STIG

Severity: Category II

Vulnerability Discussion:
If external hosts are able to query a name server on the internal network, then there is the potential that an external adversary can obtain information about internal hosts that could assist the adversary in a network attack. External hosts should never be able to learn about the internal network in this manner.

Check: DNS0405
Work with the Network administrator to determine whether external hosts are able to query a name server on the internal network. DNS runs on ports 53/TCP for zone transfers and 53/UDP for queries. These ports should be blocked at the firewall or router to internal DNS servers. If external hosts are able to query a name server on the internal network, then this is a finding.

Fix: DNS0405
Working with appropriate technical personnel, the IAO should establish firewall rules and/or router ACLs that prohibit access to the name server from external hosts.



Comments:

Vulnerability Key: V0013049

STIG ID: DNS0410

Vulnerability: The DNS server software runs on an unapproved operating system.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
If an organization runs DNS server software on an operating system that is not approved for this purpose, then it cannot benefit from assurance testing and security implementation guidance for the approved operating systems. A critical component of DNS security is the security of the operating system (OS) platforms on which the DNS software runs. If it is not possible to secure the OS, then DNS itself cannot be secure. Accordingly, organizations must select an appropriate OS for its name servers, one that has a well documented, secure and supported configuration.

Check: DNS0410
Refer to the appropriate OS STIG for current approved OS releases.

To determine whether a name server is supported by an approved operating system and version, the reviewer should ask the SA to run the winver command for Windows implementations and the uname –a for UNIX implementations from a command prompt. This will generate the operating system and version information. If the operating system supporting the DNS server software is not approved or is no longer supported, then this is a finding.

Fix: DNS0410
Working with DNS and Systems Administrators, the IAO should migrate the name server to an approved operating system platform.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

3. ALL WINDOWS OS AND UNIX OS DNS PLATFORMS (BIND AND WINDOWS DNS)

Vulnerability Key: V0012771

STIG ID: DNS0180

Vulnerability: A Host Based Intrusion Detection (HID) system is not installed and operational on a DNS server IAW DoDI 8500.2.

IA Controls: ECID-1 Host Based IDS

Categories: 14.6 HIDS/Personal Firewalls

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
A Host Based Intrusion Detection (HID) system will alert an administrator of any malicious attack against the application or operating system. Without a HID, an attack or malware may be present on the system without any awareness of the system administrator.

Check: DNS0180
Refer to the appropriate operating system STIG.

A few applications that provide host-based network intrusion protection are:

Dragon Squire by Enterasys Networks
ITA by Symantec
Hostsentry by Psionic Software
Logcheck by Psionic Software
RealSecure agent by ISS
Swatch by Stanford University

Ask the SA or IAO if a host-based intrusion detection application is loaded on the system. Use the command:

find / -name <daemon name> -print

(where <daemon name> is the name of the primary application daemon) to determine if the application is loaded on the system. Use the command:
ps –ef | grep <daemon name>
to determine if the application is active on the system.

Windows:

Review the installed applications/programs to see if a HID is employed.

Fix: DNS0180
The SA will ensure a Host Based Intrusion Detection System is installed on the DNS server as required by DoDI 8500.2. Refer to the appropriate OS STIG for guidance.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0004467

STIG ID: DNS0225

Vulnerability: Record owners will validate their zones no less than annually. The DNS database administrator will remove all zone records that have not been validated in over a year.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
If zone information has not been validated in over a year, then there is no assurance that it is still valid. If invalid records are in a zone, then an adversary could potentially use their existence for improper purposes. An SOP detailing this process can resolve this requirement.

Check: DNS0225
The reviewer should check that the record's last verified date is less than one year prior to the date of the review. If this is not the case for any host or group of hosts, then this is a finding.

Fix: DNS0225
Working with DNS Administrators and other appropriate technical personnel, the IAO should attempt to validate the hosts with expired validation dates. If these cannot be validated within a reasonable period of time, they should be removed.

A zone file should contain adequate documentation that would allow an IAO or newly assigned administrator to quickly learn the scope and structure of that zone. In particular, each record (or related set of records, such as a group of LAN workstations) should be accompanied by a notation of the date the record was created, modified, or validated and record the owner's name, title, and organizational affiliation. The owner of a record is an individual with the authority to request that the record be modified or deleted.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0004468

STIG ID: DNS0230

Vulnerability: Resource records for a host in a zone file are included and their fully qualified domain name should reside in another zone. The exception is a glue record or CNAME record supporting a system migration.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
If a name server were able to claim authority for a resource record in a domain for which it was not authoritative, this would pose a security risk. In this environment, an adversary could use illicit control of a name server to impact IP address resolution beyond the scope of that name server (i.e., by claiming authority for records outside of that servers zones). Fortunately, all but the oldest versions of BIND and most other DNS implementations do not allow for this behavior. Nevertheless, the best way to eliminate this risk is to eliminate from the zone files any records for hosts in another zone. The two key exceptions to this rule involve glue for NS records and CNAME records for legacy resolution support

Check: DNS0230
Review the zone files and confirm with the DNS administrator that the hosts defined in the zone files do not reside in another zone with its fully qualified domain name. If extraneous resource records are maintained, then this is a finding.

Fix: DNS0230
The DNS database administrator should remove any resource records for a host in a zone file if its fully qualified domain name resides in another zone, unless the record is a glue record or temporary CNAME record supporting a system migration.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0004469

STIG ID: DNS0235

Vulnerability: Zone-spanning CNAME records, that point to a zone with lesser security, are active for more than six months.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
The use of CNAME records for exercises, tests or zone-spanning aliases should be temporary (e.g., to facilitate a migration). When a host name is an alias for a record in another zone, an adversary has two points of attack the zone in which the alias is defined and the zone authoritative for the aliases canonical name. This configuration also reduces the speed of client resolution because it requires a second lookup after obtaining the canonical name. Furthermore, in the case of an authoritative name server, this information is promulgated throughout the enterprise to caching servers and thus compounding the vulnerability.

Check: DNSS0235
Review the zone files and the DNS zone record documentation to confirm that there are no CNAME records older than 6 months. If there are CNAME records older than 6 months, then this is a finding.

Fix: DNS0235
The DNS database administrator should remove any zone-spanning CNAME records that have been active for more than six months.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0004470

STIG ID: DNS0240

Vulnerability: The DNS database administrator has not ensured each NS record in a zone file points to an active name server authoritative for the domain specified in that record.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category I

Vulnerability Discussion:
Poorly constructed NS records pose a security risk because they create conditions under which an adversary might be able to provide the missing authoritative name services that are improperly specified in the zone file. The adversary could issue bogus responses to queries that clients would accept because they learned of the adversary's name server from a valid authoritative name server, one that need not be compromised for this attack to be successful. The list of slave servers must remain current within 72 hours of any changes to the zone architecture that would affect the list of slaves. If a slave server has been retired or is not operational but remains on the list, then an adversary might have a greater opportunity to impersonate that slave without detection, rather than if the slave were actually online. For example, the adversary may be able to spoof the retired slave's IP address without an IP address conflict, which would likely not occur if the true slave were active.

Check: DNS0240
Review the zone files, and confirm with the DNS administrator that each NS record points to an active name server authoritative for the domain, it this is not the case, then this is a finding.

Fix: DNS0240
The DNS database administrator should remove any NS records in a zone file that do not point to an active name server authoritative for the domain specified in that record.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0004473

STIG ID: DNS0415

Vulnerability: DNS software does not run on dedicated (running only those services required for DNS) hardware. The only currently accepted exception of this requirement is Windows 2000/2003 DNS, which must run on a domain controller that is integrated with Active Directory services.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
Even a securely configured operating system is vulnerable to the flaws of the programs that run on it. To prevent DNS software from being subjected to the vulnerabilities of other programs and services, the DNS server will not run other programs and services at all, or at least run only those programs that are necessary for either OS or DNS support.

Check: DNS0415
During the initial interviews, the reviewer may have already identified that a name server is supporting production services other than DNS. At this point, the reviewer should validate that response through a hands-on check of the actual name server.

UNIX

The only permitted services to be running on a DNS UNIX BIND server are those implementing:

- DNS
- Secure shell
- Host intrusion detection
- Host file integrity
- Network management or monitoring
- Anti-virus
- Backup
- UPS
- NTP

The below are not permitted:

Services started through inetd.conf:
admind, chargen, echo, etherstatd, fingerd, ftpd, httpd, ICQ server, identd, netstat, netstatd, nit, nntp, nsed, nsemntd, pfilt, portd, quaked, rexd, rexecd, rje_mapper, rlogind, rpc_3270, rpc_alias, rpc_database, rpc_keyserv, rpc_sched, rquotad, rsh, rstatd, rusersd, selectd, serverd, showfhd, sprayd, statmon, sunlink_mapper, sysstat, talkd, telnetd, tfsd, tftpd, timed, ttdb, ugidd, uucpd, and walld.

Services started at boot time:
NFS client, NFS server process and SNMP daemon, automounter, printer queue daemon, and RPC portmapper. (For Solaris, disable the following scripts in rc2.d: S73nfs.client, S74autofs, S80lp, S71rpc, and S99dtlogin and the following scripts in rc3.d: S15nfs.server and S76snmpd.)

Instruction: In the presence of the reviewer, the SA should enter the following command:

ps –ef

Based on the command output, the reviewer should be able to determine if the machine is dedicated to DNS or if it is supporting other production services. If additional services are running and it is determined the name server is not running on dedicated hardware, then this is a finding.

Windows

The only permitted services to be running on a Windows ISC BIND DNS server are those implementing:

- DNS (i.e., the ISC BIND service) or
- DNS Server (i.e., Windows 2000 DNS)
- Host intrusion detection
- Host file integrity
- Network management or monitoring
- Anti-virus
- Backup
- UPS
- NTP
- Active Directory/Domain Controller Services

Instruction: The reviewer should examine the Windows Services GUI to identify started services (in Windows 2000/2003, right click on “My Computer” and select “Manage.” In the left windowpane, click on “Services and Applications.” A list of services is displayed in the right windowpane. Click on the “Status” column heading to sort by status. The started services will be grouped together). Also check the “Applications” tab of “Task Manager” for applications that do not run as a service. (Simultaneously press Ctrl-Alt-Del keys and select the “Applications” tab.)

Based on this examination, the reviewer should be able to determine if the machine is dedicated to DNS or if it is supporting other production services. If additional services are running and it is determined the name server is not running on dedicated hardware, then this is a finding. The exception is Windows 2000/2003 DNS, which may run domain controllers that host Active Directory services.

Fix: DNS0415
Working with DNS and Systems Administrators, the IAO should migrate the DNS software to dedicated hardware for the purpose of supporting the name server or remove/migrate any additional programs or applications, running on the name server to ensure the name server is running on dedicated hardware.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0004475
STIG ID: DNS0420
Vulnerability: Permissions on files containing DNS encryption keys are inadequate.

IA Controls: ECCD-1 Changes to Data
ECCD-2 Changes to Data
ECSC-1 Security Configuration Compliance

Categories: 2.1 Object Permissions

Responsibility: System Administrator

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
Weak permissions could allow an intruder to view or modify DNS encryption key files. These keys should never be readable by Other or Everyone.

Check: DNS0420

UNIX

Instruction: The reviewer must work with the SA to obtain the user name running the named process.

In the presence of the reviewer, the SA should enter the following command to obtain the owner of the named process:

ps –ef | grep named

In the presence of the reviewer, the SA should enter the following command while in the directory containing the DNS encryption keys:

ls -l

If the DNS encryption key files have permissions that allow read access to anyone beyond the owner of the named process, then this is a finding.

Windows

Instruction: The reviewer must work with the SA to obtain the owner of the named.exe or dns.exe or dns.exe program.

In the presence of the reviewer, the SA should right-click on the named.exe or dns.exe or dns.exe file and select Properties | Security tab | Advanced | Owner tab.

For each DNS encryption key file, right-click on the file and select Properties | Security tab.

If the DNS encryption key files have permissions that allow read access to anyone beyond the owner of the named.exe or dns.exe or dns.exe program, then this is a finding.

Fix: DNS0420
The SA should modify permissions of the files containing DNS encryption keys so that only the DNS software process ID (PID) has read access to these files.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0004476

STIG ID: DNS0425

Vulnerability: Users and/or processes other than the DNS software Process ID (PID) and/or the DNS database administrator have edit/write access to the zone database files.

IA Controls: ECCD-1 Changes to Data
ECCD-2 Changes to Data

Categories: 2.1 Object Permissions

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
Weak permissions on key files could allow an intruder to view or modify DNS zone files. Permissions on these files will be 640 or more restrictive.

Check: DNS0425

UNIX

Instruction: The review must obtain the username and groupname of the DNS database administrator. The reviewer must work with the SA to obtain the username and groupname of the DNS database administrator, DNS software administrator, and the username running the named daemon process.

In the presence of the reviewer, the SA should enter the following command to obtain the owner of the named process:

ps –ef | grep named

There are different ways (e.g., password/group file, NIS+, etc.) to obtain the DNS database administrator's username and groupname, the reviewer is to work with the SA to obtain this information based on the configuration of the site's UNIX OS.

In the presence of the reviewer, the SA should enter the following command while in the directory containing the zone files:

ls -l

If the zone files have permissions that allow write access to anyone beyond the owner of the named process or the DNS database administrator then this is a finding.

Windows

Instruction: The review must obtain the username and groupname of the DNS database administrator. The reviewer must work with the SA to obtain the owner of the named.exe or dns.exe or dns.exe program.

In the presence of the reviewer, the SA should right-click on the named.exe or dns.exe or dns.exe file and select Properties | Security tab | Advanced | Owner tab.

For each zone file, right-click on the file and select Properties | Security tab.

If the zone files have permissions that allow write access to anyone beyond the owner of the named.exe or dns.exe or dns.exe program or the DNS database administrator, then this is a finding.

Fix: DNS0425
The SA should modify permissions of zone files that only the DNS software PID and/or the DNS database administrator have edit access to the zone database files.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0004477

STIG ID: DNS0430

Vulnerability: Users or processes other than the DNS software administrator and the DNS software PID have read access to the DNS software configuration files and/or users other than the DNS software administrator have write access to these files.

IA Controls: ECCD-1 Changes to Data
ECCD-2 Changes to Data
ECSC-1 Security Configuration Compliance

Categories: 2.1 Object Permissions

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
Weak permissions on key DNS configuration files could allow an intruder to view or modify DNS name server configuration files.

Check: DNS0430

UNIX

Instruction: The reviewer must work with the SA to obtain the username and groupname of the DNS software administrator and the username running the named daemon process.

In the presence of the reviewer, the SA should enter the following command to obtain the owner of the named process:

ps –ef | grep named

There are different ways (i.e., password/group file, NIS+, etc.) to obtain the DNS software administrator's username and groupname, the reviewer is to work with the SA to obtain this information based on the configuration of the site's UNIX OS.

In the presence of the reviewer, the SA should enter the following command while in the directory containing the DNS configuration files:

ls -l

If the DNS configuration files have permissions that allow write access to anyone beyond the DNS software administrator or permissions that allow read access to anyone beyond the owner of the named process or the DNS software administrator then this is a finding.

Windows

Instruction: The reviewer must work with the SA to obtain the username and groupname of the DNS software administrator and the owner of the named.exe or dns.exe or dns.exe program.

In the presence of the reviewer, the SA should right-click on the named.exe or dns.exe file and select Properties | Security tab | Advanced | Owner tab.

For each DNS configuration file, right-click on the file and select Properties | Security tab.

If the DNS configuration files have permissions that allow write access to anyone beyond the DNS software administrator or permissions that allow read access to anyone beyond the owner of the named process or the DNS software administrator then this is a finding.

Fix: DNS0430
The SA should modify permissions of the DNS name server configuration files so that only the DNS software administrator and the DNS software PID have read access to the DNS software configuration files and that only the DNS software administrator has write access to these files.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0004478

STIG ID: DNS0435

Vulnerability: The name server's IP address is not statically defined and configured locally on the server. The name server has a DHCP address.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
Static IP addresses permit a machine to offer Internet services like web, ftp, DNS, and email. Because a specific, known address is associated with your connection, other machines on the Internet know where to send traffic destined for your server. Required ACL restrictions at the router and or firewall are required to protect the DNS server from unauthorized access. Such ACLS require a static IP address to be effective.

Check: DNS0435

UNIX

Instruction: In the presence of the reviewer, the SA should enter the following command to verify the IP address is not obtained by DHCP, hme0 is used as an example, please confirm the interface:

ifconfig hme0 auto_dhcp status

If "Ifconfig: hme0: interface is not under DHCP control," is not displayed, then this is a finding.

Please note this above mentioned command does not work on every version of UNIX, if this command does not work, please use the below instruction.

In the presence of the reviewer, the SA enters the following command while in the /etc directory: The reviewer should ensure the file /etc/dhpc.hme0 is not located on the server.

ls -l

If the file dhcp.hme0 is listed (interface designation may different), then this is a finding.

Windows

Instruction: In the presence of the reviewer, the SA should select Start | Run, this will bring up the "Run" dialog box. Type cmd at the command line, this will bring up the command screen. Enter the following command:

ipconfig /all

If "DHCP Enabled" is not set to "No," then this is a finding.

Fix: DNS0435
The SA should configure the name server with an IP address that is statically defined.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0004479

STIG ID: DNS0440

Vulnerability: An integrity checking tool is not installed or not monitoring for modifications to the root.hints and named.conf files.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 10.1 Procedures

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
An integrity checking tool compares file and directory integrity to the baseline. It can alert the system administrator to unauthorized changes in files or directories. Unauthorized changes in files and directories can give a user unauthorized access to system resources. Undetected changes to DNS name server root hints and configuration files is the single greatest risk to the security and stability of the DNS name server. An integrity checking tool (e.g., Tripwire) aids in effectively monitoring and controlling changes to ensure improved security and system availability. This applies to both authoritative and caching name servers.

Check: DNS0440

UNIX

Instruction: The reviewer must work with the SA to obtain the program name.

In the presence of the reviewer, the SA should enter the following command to confirm the integrity checking tool is installed and running:

ps –ef | grep process name

If an integrity checking tool is not installed and running, then this is a finding.

With the assistance of the SA, confirm that the integrity checking tool is monitoring for any modifications to the root hints and name server's configuration (e.g., named.conf), if this is not the case, then this is a finding. If using ISC BIND name server software, common names for the root hints file are root.hints, named.cache, or db.cache. The name is configurable within the named.conf file. rndc.conf will be protected in the same manner.

Windows

Instruction: The reviewer must work with the SA to obtain the service name.

Instruction: The reviewer should examine the Windows Services GUI to identify started services (in Windows 2000/2003, right click on "My Computer" and select "Manage". In the left windowpane, click on "Services and Applications". A list of services is displayed in the right windowpane. Click on the "Status" column heading to sort by status. The started services will be grouped together). Also check the "Applications" tab of "Task Manager" for applications that do not run as a service (Simultaneously press Ctrl-Alt-Del keys and select the "Applications" tab). The reviewer should be able to determine if an integrity checking tool is installed and running.

If an integrity checking tool is not installed and running, then this is a finding.

With the assistance of the SA, confirm that the integrity checking tool is monitoring for any modifications to the root hints and DNS configuration files (e.g., named.conf), if this is not the case, then this is a finding.

Fix: DNS0440
The SA should install an integrity checking tool on the name server and configure the tool to monitor for any modifications to the root.hints and name server configuration files.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0004481

STIG ID: DNS0450

Vulnerability: Dynamic updates are not cryptographically authenticated.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 8.6 Object Integrity

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category I

Vulnerability Discussion: The dynamic update capability has considerable appeal in an environment in which IP addresses change so frequently that it would be unacceptably burdensome or expensive to dedicate the time of a DNS database administrator to this function. This condition would likely be met at sites that rely on the Dynamic Host Configuration Protocol (DHCP) to assign IP addresses to client devices such as workstations, laptops, and IP telephones. It would also apply to sites that utilize frequently changing service (SRV) records. On the other hand, dynamic updates can pose a security risk if the proper security controls are not implemented. When dynamic updates are permitted without any mitigating controls, a host with network access to the name server can modify any zone record with an appropriately crafted dynamic update request. The solution is to require cryptographic authentication of all dynamic update requests, but not all DNS software supports this functionality.

Check: DNS0450

BIND

Instruction: The reviewer should review the configuration files and check each zone statement for the presence of the allow-update phrase, which enables cryptographically authenticated dynamic updates:

The reviewer should identify the allow-update phrase. The following example disables dynamic updates:

allow-update {none;};

If dynamic updates are not disabled, as shown in the above example, they must be cryptographically authenticated as shown in the below example.

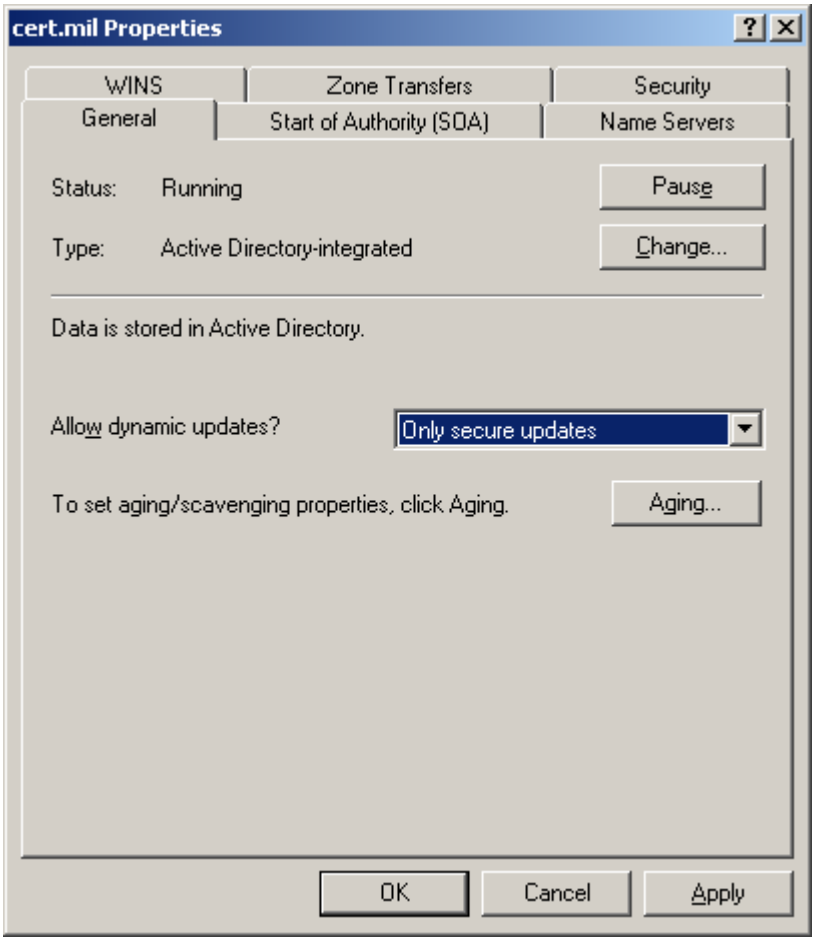
The following example demonstrates cryptographically authenticated dynamic updates:

allow-update {key ns1.kalamazoo.disa.mil_ns2.kalamazoo.disa.mil;
};

If dynamic updates are not disabled or cryptographically authenticated, then this is a finding.

Windows 2000/2003 DNS

Instruction: In the presence of the reviewer, the SA must review the "Properties" dialog box, select the "General" tab, and check to see if dynamic updates are allowed. If dynamic updates are enabled, ensure that "Only secure updates" has been selected. If this is not the case, then this is a finding.



Fix: DNS0450
For BIND implementations, the DNS software administrator must ensure that each zone statement in named.conf contains the phrase allow update{none;}; to disable dynamic updates or allow-update {key ks1.kalamazoo.disa.mil_ns2.kalamazoo.disa.mil;}; (this is an example key name) to encrypt dynamic updates. For Windows 2000 DNS, disable dynamic updates or if dynamic updates are allowed via the General tab within the Properties dialog box, the DNS software administrator should select Only secure updates. In cases in which the name server is not running BIND or Windows 2000 DNS, the DNS software administrator must determine how

to disable dynamic updates or encrypt them. If this is not possible, then the product must be replaced as soon as it is feasible to do so.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0004482

STIG ID: DNS0455

Vulnerability: A slave supporting a zone does not cryptographically authenticate its master before accepting zone updates.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 1.4 Authentication Services

Responsibility: System Administrator

References: DNS STIG

Severity: Category I

Vulnerability Discussion:
A slave updates its zone information by requesting a zone transfer from its master. In this transaction, the risk for the slave is that the response to its request is not in fact from its authorized master but from an adversary posing as the master. In this scenario, such an adversary would be able to modify and insert records into the slave's zone at will. To protect against this occurrence, the slave must be able to authenticate the master to provide assurance that any zone updates are valid.

Check: DNS0455

BIND

Instruction: This check is only applicable to slave servers. If there is not an allow-transfer phrase within the zone statement, then this is a CAT I finding. If there is an allow-transfer statement, there must be a TSIG key corresponding to each of the zone partners. The reviewer can validate this by examining the key and server statements within named.conf. Check the keys phrase within each of the server statements. Verify the key statement is configured to cryptographically authenticate the master name server; an example is provided below, if this is not configured, then this is a finding.

On the master name server, this is an example of a configured key statement:

```
key ns1.kalamazoo.disa.mil_ns2.kalamazoo.disa.mil. {
algorithm hmac-md5;
include "/etc/dns/keys/tsig-example.key";
};

zone “disa.mil” {
type master;file “db.disa.mil”;
```

```
allow-transfer { key ns1.kalamazoo.disa.mil_ns2.kalamazoo.disa.mil.; };
};
```

On the slave name server, this is an example of a configured key statement:

```
key ns1.kalamazoo.disa.mil_ns2.kalamazoo.disa.mil. {
        algorithm hmac-,d5;
        include "/etc/dns/keys/tsig-example.key";
};

server 10.2.2.2 {
        keys {ns1.kalamazoo.disa.mil_ns2.kalamazoo.disa.mil};
};

zone “disa.mil” {
        type slave;
        masters { 10.1.1.1; };
        file “db.disa.mil”;
};
```

A violation of this requirement can have one of two severity levels depending upon the extent of the violation. If slaves do not authenticate master servers in any manner, then the discrepancy would be a Category I finding. If some form of authentication exists (i.e., based on IP address), but it is not based on cryptography, then the discrepancy would be a Category II finding.

Windows 2000/2003 DNS:

Instruction: This check only applies if the name server is a caching name server. If the Windows DNS name server is configured as a caching name server, then this is a finding.

In cases in which the name server is not running BIND or Windows DNS, the reviewer must still examine the configuration and its documentation to validate this requirement.

Mitigation:

A violation of this requirement can have one of two severity levels depending upon the extent of the violation. If slaves do not authenticate masters in any manner, then the discrepancy would be a Category I finding. If some form of authentication exists (i.e., based on IP address), but it is not based on cryptography, then the discrepancy would be a Category II finding.

Fix: DNS0455

The DNS software administrator should configure each slave supporting a zone to cryptographically authenticate its master before accepting zone updates.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0004483

STIG ID: DNS0460

Vulnerability: A zone master server does not limit zone transfers to a list of active slave name servers authoritative for that zone.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
The risk to the master in this situation is that it would honor a request from a host that is not an authorized slave, but rather an adversary seeking information about the zone. To protect against this possibility, the master must first have knowledge of what machines are authorized slaves.

Check: DNS0460

BIND

Instruction: This check is only applicable to zone master servers. If there are no allow-transfer phrases within named.conf, then this is a finding. If there are allow-transfer phrases, then check that there is one corresponding to each of the zone partners. If this is not the case, then this is also a finding.

If there are allow-transfer phrases for servers other than those supplied, then there may be a finding associated with the incompleteness of the list.

If the key statement references a file, then no other key statement should reference the same file.

If the key statement includes a character representation of the key itself (an improper configuration), then no other key statement should include the same character string.

On the master name server, this is an example of a configured allow-transfer phrase:

```
zone “disa.mil” {
        type master;
        file “db.disa.mil”;
        allow-transfer {10.10.10.1; key ns1.kalamazoo.disa.mil_ns2.kalamazoo.disa.mil.; };
};
```

Windows 2000/2003 DNS

If “Allow zone transfers:” is checked, “Only to the following servers” must also be checked. The reviewer must validate the name servers listed. If this is not the case, then this is a finding.

Fix: DNS0460
The DNS software administrator should configure each zone master server to limit zone transfers to a list of active slaves authoritative for that zone. Configuration details may be found in the DNS STIG Section 4.2.8.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: **V0004484**

STIG ID: DNS0465

Vulnerability: A zone master server does not cryptographically authenticate slaves requesting a zone transfer.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 1.3 Identity Management

Responsibility: System Administrator

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
The risk to the master in this situation is that it would honor a request from a host that is not an authorized slave, but rather an adversary seeking information about the zone. To protect against this possibility, the master must first have knowledge of what machines are authorized slaves. Then the master must authenticate each slave when the slave requests a zone transfer.

Check: DNS0465
This check is only applicable to master name servers. If there is no allow-transfer phrase within the options or zone statement, this is a finding. If there is an allow-transfer statement, there is to be a TSIG key corresponding to each of the zone partners. The reviewer can validate this by examining the key and server statements within named.conf. If the TSIG key of any other host is included in this phrase, then this is a finding.

BIND
On the master name server, this is an example of a configured key statement:

```
key ns1.kalamazoo.disa.mil_ns2.kalamazoo.disa.mil. {
algorithm hmac-md5;
include "/etc/dns/keys/tsig-example.key";
};

zone “disa.mil” {
        type master;
        file “db.disa.mil”;
allow-transfer { key ns1.kalamazoo.disa.mil_ns2.kalamazoo.disa.mil.; };
};
```

On the slave name server, this is an example of a configured key statement:

```
key ns1.kalamazoo.disa.mil_ns2.kalamazoo.disa.mil. {
algorithm hmac-md5;
include "/etc/dns/keys/tsig-example.key";
};

server 10.2.2.2 {
                keys {ns1.kalamazoo.disa.mil_ns2.kalamazoo.disa.mil};
};

zone “disa.mil” {
        type slave;
        masters { 10.1.1.1; };
        file “db.disa.mil”;
};
```

Windows DNS
If “Allow zone transfers:” is checked, then this is a finding.

Fix: DNS0465
The DNS software administrator should configure each zone master server to cryptographically authenticate any slave requesting a zone transfer.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0004485

STIG ID: DNS0470

Vulnerability: A name server is not configured to only accept notifications of zone changes from a host authoritative for that zone.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
A slave updates its zone information by requesting a zone transfer from its master. In this transaction, the risk for the slave is that the response to its request is not in fact from its authorized master but from an adversary posing as the master. In this scenario, such an adversary would be able to modify and insert records into the slave's zone at will. To protect against this occurrence, the slave must be able to authenticate the master to provide assurance that any zone updates are valid.

Check: DNS0470

BIND

Instruction: If all of a zone's NS records are valid, then the default behavior in BIND complies with this requirement and does not require the DNS software administrator to take any additional action.

In some cases, the DNS software administrator must implement a non-default configuration to comply with operation requirements. If this is the case, the DNS software administrator must have an understanding of the named.conf options that govern how master name servers notify other hosts of zone changes and when slave servers will accept notifications. If none of these options are selected, the resulting behavior represents an acceptable security risk. If these phrases are configured, then this is a finding.

The three phrases within the options statement that govern this behavior are:

- notify – which turns notification on or off (defaults to on)

- also-notify – which defines servers other than those listed in NS records that will be sent notifications (defaults to none)

- allow-notify – which defines from which servers a slave will accept notifications (defaults to the master name server only)

Windows DNS

Instruction: This check only applies if the name server is a caching name server, the Windows 2000/2003 DNS servers are to only be configured as master name servers. If the Windows DNS name server is configured as a caching name server, then this is a finding.

In cases in which the name server is not running BIND or Windows DNS, the reviewer must still examine the configuration and its documentation to validate this requirement.

Fix: DNS0470
The DNS software administrator should configure a name server to only accept notifications of zone changes from a host authoritative for that zone. Configuration details may be found in the DNS STIG.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0004486

STIG ID: DNS0475

Vulnerability: Recursion is not prohibited on an authoritative name server.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
A potential vulnerability of DNS is that an attacker can poison a name server's cache by sending queries that will cause the server to obtain host-to-IP address mappings from bogus name servers that respond with incorrect information. Once a name server has been poisoned, legitimate clients may be directed to non-existent hosts (which constitutes a denial of service) or, worse, hosts that masquerade as legitimate ones to obtain sensitive data or passwords. To guard against poisoning, name servers authoritative for .mil domains should be separated functionally from name servers that resolve queries on behalf of internal clients. Organizations may achieve this separation by dedicating machines to each function or, if possible, by running two instances of the name server software on the same machine; one for the authoritative function and the other for the resolving function. In this design, each name server process may be bound to a different IP address or network interface to implement the required segregation.

Check: DNS0475

BIND

Instruction: This check only applies if the name server is a master name server.

The reviewer should identify the recursion and allow-query phrases. They should look as follows:

```
Options {
        recursion no;
        allow-query {none;};
};

Zone “example.com” {
        Type master;
        File “db.example.com”;
```

```
Allow-query {none;};
};
```

If either of these phrases is missing or have a value other than what is listed above, then this is a finding.

Windows 2000/2003 DNS

Instruction: This check only applies if the name server is a master name server, the Windows DNS servers are to only be configured as master name servers.

If “Enable forwarders” is checked, this constitutes a finding.

Also examine the “Advanced” tab of the DNS server “Properties” dialog box. If “Disable recursion” is not checked, then this is a finding.

Fix: DNS0475
The DNS Administrator should configure the authoritative name server to prohibit recursion. Configuration details may be found in the DNS STIG.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0004487

STIG ID: DNS0480

Vulnerability: A caching name server does not restrict recursive queries to only the IP addresses and IP address ranges of known supported clients.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
Any host that can query a resolving name server has the potential to poison the servers name cache or take advantage of other vulnerabilities that may be accessed through the query service. The best way to prevent this type of attack is to limit queries to internal hosts, which need to have this service available to them.

Check: DNS0480

BIND

Instruction: This check is only applicable to caching name servers. Verify the allow-query and allow-recursion phrases are properly configured.

The reviewer should identify the allow-query and allow-recursion phrases. It should look as follows:

allow-query {trustworthy_hosts;};
allow-recursion {trustworthy_hosts;};

The name of the ACL does not need to be “trustworthy_hosts” but the name should match the ACL name defined earlier in named.conf for this purpose. If not, then this is a finding. The reviewer will also check for whether non-internal IP addresses appear in either the referenced ACL (e.g., trustworthy_hosts) or directly in the statements themselves. If non-internal IP addresses do appear, then this is a finding.

Windows 2000/2003 DNS

Instruction: Windows 2000/2003 DNS should not be deployed as a caching name server. Consequently, the use of forwarders and recursion is prohibited on Windows DNS. The

reviewer will validate that the "Disable recursion" and the “Secure cache against pollution" on the “Advanced” tab of the name server properties are selected. Examine the “Advanced” tab of the DNS Server “Properties” dialog box. If “Disable recursion” and “Secure cache against pollution” is not checked, then this is a finding.

The reviewer will also validate that the "Enable forwarders" on the “Forwarders” tab of the name server properties is not selected. Examine the “Forwarders” tab of the DNS Server “Properties” dialog box. If “Enable forwarders” is checked, then this is a finding.

In cases in which the name server is not running BIND or Windows 2000/2003 DNS, the reviewer must still examine the configuration and its documentation to validate this requirement.

Fix: DNS0480
The DNS software administrator should configure the caching name server to accept recursive queries only from the IP addresses and address ranges of known supported. Configuration details for BIND and Windows DNS may be found in the DNS STIG.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0012774

STIG ID: DNS0482

Vulnerability: The forwarding configuration of DNS servers allows the forwarding of queries to servers controlled by organizations outside of the U.S. Government.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
A side-effect of forwarding is that if the link between the forwarding server and the server to which queries are being forwarded is broken, DNS resolution will not work for the domain or domains being forwarded to the remote server. Query forwarding also allows the administrators of the remote server to change the DNS responses that are received by the clients of the forwarding servers. Organizations need to carefully configure any forwarding that is being used by their caching name servers. They should only configure "forwarding of all queries" to servers within the DoD. Systems configured to use domain-based forwarding should not forward queries for mission critical domains to any servers that are not under the control of the US Government.

Check: DNS0482

BIND

This check applies to caching servers only. Review the "options" statement in the named.conf file. The forwarders statement will have either a list of IP addresses or a name, which is defined by the ACL. Review the list of addresses for compliance. If they are outside of U.S. Government controlled IP address ranges, this is a finding. Some DNS servers are preconfigured, the defaults must be changed.

Windows DNS:

Windows DNS should not be deployed as a caching name server. Consequently, the use of forwarders is prohibited on Windows 2000/2003 DNS.

Fix: DNS0482

The SA will ensure the forwarding configuration of DNS servers does not forward queries to any servers controlled by organizations outside the US Government.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0004488

STIG ID: DNS0485

Vulnerability: The DNS software does not log, at a minimum, success and failure of starting and stopping of the name server service daemon, zone transfers, zone update notifications, and dynamic updates.

IA Controls: ECCD-1 Changes to Data
ECCD-2 Changes to Data
ECSC-1 Security Configuration Compliance

Categories: 10.2 Content Configuration

Responsibility: System Administrator

References: DNS STIG

Severity: Category I

Vulnerability Discussion:
Logging must be comprehensive to be useful for both intrusion monitoring and security investigations. Setting logging at the severity notice should capture most relevant events without requiring unacceptable levels of data storage. The severity levels notice and debug are also available to organizations that require additional logging for certain events or applications.

Check: DNS0485

DNS software administrators need DNS transaction logs for a wide variety of reasons including troubleshooting, intrusion detection, and forensics. The events the name server logs are to contain, at a minimum, success and failure of the following events:

- start and stop of the name server service or daemon
- zone transfers
- zone update notifications
- dynamic updates

BIND

Instruction: For a BIND configuration: if a logging statement is present, it will have the form:

```
logging {
        channel channel_name
                file path_name | syslog syslog_facility
severity (critical | error | warning |
```

```
                notice | info | debug [level]| dynamic);]
print-severity yes/no;
print-time yes/no;
};

category category_name {
        channel_name ; [ channel_name ; …
                };
};
```

Instruction: If a logging statement is not present, then this is a finding. The reviewer will look at the severity clause in each of the channel phrases of the logging statement. It should read either notice, info or debug for each defined channel (although debug would not typically appear unless the review is concurrent with a troubleshooting effort). If the logging statement is not properly configured, then this is a finding.

Windows DNS

Instruction: For a Windows 2000/2003 DNS configuration: On the "Logging Tab" of the "DNS Server Properties" dialog box, if "Notify", and "Update" are not checked in the "Debug Logging" options, then this is a finding.

Mitigation: DNS0485
A violation of this requirement can have one of two severity levels depending upon the extent of the violation. If no logging exists, then the discrepancy would be a Category I finding. If some logging exists, but not for all of the events listed, then the discrepancy would be a Category II finding.

Fix: DNS0485
The DNS software administrator will configure the DNS software to log, at a minimum, success and failure of the following events:
- start and stop of the name server service or daemon
- zone transfers
- zone update notifications
- dynamic updates

Additional configuration details for BIND may be found in the DNS STIG Section 4.2.5 and configuration details for Windows 2000/ 2003 DNS may be found in the DNS STIG Section 5.7.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0004489

STIG ID: DNS0490

Vulnerability: The DNS software administrator has not configured the DNS software to send all log data to either the system logging facility (e.g., UNIX syslog or Windows Application Event Log) or an alternative logging facility with security configuration equivalent to or more restrictive than the system logging facility.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 10.2 Content Configuration

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
On name servers, DNS log data is typically more sensitive than system log data and, consequently, should benefit from security controls at least as restrictive as those for the system logging facility. DNS software administrators require DNS transaction logs for a wide variety of reasons including troubleshooting, intrusion detection, and forensics. These logs should be appropriately secured, having file permissions that restrict unauthorized changes or viewing, and archived, being appropriately backed-up and stored in order for them to be examined at a future time. Furthermore, it is required that the logs be reviewed daily.

Check: DNS0490
DNS software administrators need DNS transaction logs for a wide variety of reasons including troubleshooting, intrusion detection, and forensics. These logs should be appropriately secured, having file permissions that restrict unauthorized changes or viewing, and archived, being appropriately backed-up and stored so that they can be examined at a future time.

BIND

The DNS software administrator will configure the DNS software to send all log data to either the system logging facility (e.g., UNIX syslog or Windows Application Event Log) or an alternative logging facility with security configuration equivalent to or more restrictive than the system logging facility.

Instruction: On an examination of the DNS configuration file (if BIND, named.conf), the reviewer can determine whether log data is sent to a facility other than the system logging facility. If this is the case, then the reviewer should do the following at a minimum:

- Compare the file permissions of the operating system logs with the file permissions of the alternative logging facility for DNS (e.g., using ls –l). If the permissions on the alternative are weaker in any manner, this constitutes a finding.

- Determine whether the system logs are transferred or copied to media on another machine (e.g., a cron job that periodically moves logs to another computer). If this is the case and there is not a similar technology in place for the DNS logs, then this constitutes a finding.

The reviewer can identify other ways in which the security of the DNS logs may be weaker than the security of the system logs, and can generate a finding based on that discovery so long as the explanation of the weakness is clearly documented in the SRR results.

Windows DNS

Windows DNS software log files will be equivalent to the system logging facility by default.

In cases in which the name server is not running BIND or Windows DNS, the reviewer must still examine the configuration and its documentation to validate this requirement.

Fix: DNS0490
The DNS software administrator should either configure named.conf to utilize the system logging facility or place additional technical controls (e.g., more restrictive file permissions) on the alternative logging facility so that it is as least as secure as the system logging facility.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0004490

STIG ID: DNS0495

Vulnerability: Entries in the name server logs do not contain timestamps and severity information.

IA Controls: ECAR-1 Audit Record Content
ECAR-2 Audit Record Content
ECAR-3 Audit Record Content
ECSC-1 Security Configuration Compliance

Categories: 10.2 Content Configuration

Responsibility: System Administrator

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
Forensic analysis of security incidents and day-to-day monitoring are substantially more difficult if there are no timestamps on log entries.

Check: DNS0495

BIND

Instruction: Based on the logging statement in named.conf, the reviewer can determine where the DNS logs are located. If their logging is not configured, then this is a finding. These logs (which in many cases are likely to be the system logs), should be viewed using the UNIX cat or tail commands, a text editor, or – in the case of Windows – the "Event Viewer." When examining the logs, the reviewer should ensure that entries have timestamps and severity codes. If timestamps and severity codes are not found on one or more entries, then this is a finding.

```
logging {
                channel channel_name
                        file path_name | syslog syslog_facility
severity (critical | error | warning |
  notice | info | debug [level]| dynamic);]
                        print-severity yes/no;
                        print-time yes/no;
                };
                category category_name {
                        channel_name ; [ channel_name ; …
                };
```

};

Instruction: If the DNS entries in the logs do not note their severity (i.e., critical, error, warning, notice, or info), then this constitutes a finding.

Windows DNS

Windows DNS software adds timestamps and severity information by default.

In cases in which the name server is not running BIND or Windows DNS, the reviewer must still examine the configuration and its documentation to validate this requirement.

Fix: DNS0495
The DNS software administrator should configure the DNS software to add timestamps and severity information to each entry in all logs. Configuration details for BIND may be found in the DNS STIG Section 4.2.5.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0004491

STIG ID: DNS0500

Vulnerability: Valid root name servers do not appear in the local root zone file. G and H root servers, at a minimum, do not appear in the local root zone files.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category I

Vulnerability Discussion:
All caching name servers must be authoritative for the root zone because without this starting point, they would have no knowledge of the DNS infrastructure and thus would be unable to respond to any queries. The security risk is that an adversary could change the root hints and direct the caching name server to a bogus root server. At that point, every query response from that name server is suspect, which would give the adversary substantial control over the network communication of the name servers clients. When authoritative servers are sent queries for zones that they are not authoritative for, and they are configured as a non-caching server (as recommended), they can either be configured to return a referral to the root servers or they can be configured to refuse to answer the query. The recommendation is to configure authoritative servers to refuse to answer queries for any zones for which they are not authoritative. This is more efficient for the server, and allows it to spend more of its resources doing what its intended purpose is; answering authoritatively for its zone. The security risk is that an adversary could change the root hints and direct the caching name server to a bogus root server. At that point, every query response from that name server is suspect, which would give the adversary substantial control over the network communication of the name server's clients.

Check: DNS0500

BIND

Instruction: This check is only applicable to caching name servers. Review the entries within the root hints file and validate that the entries are correct. Common names for the root hints file are root.hints, named.cache, or db.cache. The name is configurable within the named.conf file. Refer to the DNS Checklist for the correct entries.

Windows DNS

Instruction: This check only applies if the name server is a caching name server, the Windows DNS servers are to only be configured as master name servers. This requirement is only valid if the Windows DNS server is configured as a caching server, which would result in another finding.

In cases in which the name server is not running BIND or Windows DNS, the reviewer must still examine the configuration and its documentation to validate this requirement.

Fix: DNS0500
The DNS database administrator should configure the root hints file with these valid listed IP addresses.

Root Server	IP Address
A	198.41.0.4
B	192.228.79.201
C	192.33.4.12
D	128.8.10.90
E	192.203.230.10
F	192.5.5.241
G	192.112.36.4
H	128.63.2.53
I	192.36.148.17
J	192.58.128.30
K	193.0.14.129
L	198.32.64.12
M	202.12.27.33

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0004492

STIG ID: DNS0505

Vulnerability: The DNS software administrator has not removed the root hints file on an authoritative name server in order for it to resolve only those records for which it is authoritative, and ensure that all other queries are refused.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category IV

Vulnerability Discussion:
A potential vulnerability of DNS is that an attacker can poison a name server's cache by sending queries that will cause the server to obtain host-to-IP address mappings from bogus name servers that respond with incorrect information. The DNS architecture needs to maintain one name server whose zone records are correct and the cache is not poisoned. In this effort to prevent the authoritative name server from forwarding queries, is to delete the root hints. When authoritative servers are sent queries for zones that they are not authoritative for, and they are configured as a non-caching server (as recommended), they can either be configured to return a referral to the root servers or they can be configured to refuse to answer the query. The requirement is to configure authoritative servers to refuse to answer queries for any zones for which they are not authoritative. This is more efficient for the server, and allows it to spend more of its resources doing what its intended purpose is; answering authoritatively for its zone.

Check: DNS0505

BIND

Instruction: This check only applies if the name server is an authoritative name server. Ensure there is not a root hints on the name server. Common names for the root hints file are root.hints, named.cache, or db.cache. The name is configurable within the named.conf file.

Windows DNS

This check only applies if the name server is an authoritative name server. For a Windows 2000/2003 DNS configuration: Select the "Root Hints" Tab of the "DNS Server Properties" dialog box, ensure the root name server entries have been removed. To remove entries, right click the entry and click the "Remove" button.

Fix: DNS0505
The SA should remove the root hints file. For a BIND installation, the SA should remove the root hints file. Common names for the root hints file are root.hints, named.cache, or db.cache. The name is configurable within the named.conf file.

For a Windows 2000/2003 DNS configuration, the SA should: Select the Root Hints Tab of the DNS Server Properties dialog box, to remove entries, right click the entry and click the Remove button.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

4. BIND RUNNING ON UNIX OR WINDOWS OS

Vulnerability Key: V0012365

STIG ID: DNS0195

Vulnerability: The TSIG key is not a minimum of 128 bits in length.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS; 8.4 Key Management

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
An important consideration in evaluating the suitability of a particular encryption package for a particular application is the encryption key length. The lengthier the encoding key, the harder it is for an assailant to guess the right key to use to unlock your secret. The RFC and NIST recommend using keys 128 bits long at a minimum due to security vulnerabilities associated with shorter key lengths. An attacker with a large budget can crack a short key length in a matter of hours.

Check: DNS0195
Examine the public key file and it should contain "128"

example.domain.com. IN KEY 128 3 157 dlV1EKwOtxquWRX15IdNrg==

Fix: DNS0195
The SA will ensure the TSIG key is a minimum of 128 bits in length.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0012440

STIG ID: DNS0250

Vulnerability: A unique TSIG key is not generated and utilized for each type of transaction.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category III

Vulnerability Discussion: To enable zone transfer (requests and responses) through authenticated messages, it is necessary to generate a key for every pair of name servers. The key also can be used for securing other transactions, such as dynamic updates, DNS queries, and responses.

Check: DNS0250
Verify in the named.conf file that the key statement has a unique file name and location depending on transaction type.

Fix: DNS0250
The SA will ensure a new TSIG key is generated and utilized for each type of transaction (zone transfer, dynamic updates, etc)

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0004480

STIG ID: DNS0445

Vulnerability: A cryptographic key used to secure DNS transactions has been utilized on a name server for more than one year.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 8.4 Key Management

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
Keys are more likely to be compromised if they remain in use for over a year.

Check: DNS0445
Instruction: With the SA's assistance, the reviewer should locate the file directory that contains the TSIG keys (i.e., /etc/dns/keys/) and then list the files in that directory (e.g., by using the UNIX ls –l command). The key statements in named.conf will provide the location of the key files. If any of them have a last modified time stamp that is more than one year old, then this is a finding.

Fix: DNS0445
The IAO should execute the organizations procedure for TSIG key supersession.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0004498

STIG ID: DNS0700

Vulnerability: BIND 8.4.7 and above, 9.2.6 and above, or 9.3.1 and above is not installed.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
Earlier versions of BIND either do not have the required security functionality or have not undergone an equivalent level security testing as BIND 9. In particular, BIND 4 does not support TSIG authentication of zone transfers. BIND 8 code has a long history of security vulnerabilities, not all of which may have been discovered. Later versions of BIND 9, on the other hand, was developed with a special emphasis on security.

Check: DNS0700
Validation of compliance with the requirements is determined via an operating system console. An authorized SA should perform the required actions. He or she will work side-by-side with the reviewer to determine which commands are most appropriate at certain points in the review.

UNIX

Instruction: In the presence of the reviewer, the SA should enter the following command:

named –v

or,

what /usr/sbin/named | grep named

If a version of BIND 8.4.7 and above, 9.2.6 and above, or 9.3.1 and above is not installed then this is a finding. If subsequent IAVA guidance recommends a BIND upgrade, then that guidance will supersede this requirement.

Windows

Instruction: The reviewer must work with the SA to obtain the owner of the named.exe or dns.exe service.

In the presence of the reviewer, the SA should right-click on the named.exe or dns.exe service name file and select Properties | Version tab.

The version should be displayed in the “Description” field.

If a version of BIND prior to BIND 8.4.7 and above, 9.2.6 and above, or 9.3.1 and above is not running, then this is a finding. If subsequent IAVA guidance recommends a BIND upgrade, then that guidance will supersede this requirement.

Fix: DNS0700
Working with DNS Administrators and other appropriate technical personnel, the IAO will ensure version BIND 8.4.7 and above, 9.2.6 and above, or 9.3.1 and above is not installed. If subsequent IAVA guidance recommends a BIND upgrade, that guidance will supersede this requirement.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0004493

STIG ID: DNS0705

Vulnerability: The DNS software administrator has not utilized 128-bit HMAC-SHA1 keys or 128-bit HMAC-MD5 keys.

IA Controls: DCNR-1 Non-repudiation

Categories: 8.4 Key Management

Responsibility: System Administrator

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
Future versions of BIND are expected to include support for SHA-1, which is the algorithm currently specified in the National Institute of Standards and Technology's (NISTs) Secure Hashing Standard (FIPS 180-1) and required throughout DoD. When it is available, hmac md5 should be replaced with hmac-sha1 for DNS TSIG applications. In general, only NIST or National Security Agency (NSA) approved algorithms should be utilized in the DoD computing infrastructure. The US Government currently requires SHA-1 for hashing applications. It is considered an improvement over MD5, for which there are known instances of collisions.

Check: DNS0705
There is to be a properly configured key statement located in the named.conf file. As of the release of this checklist, BIND only supports the HMAC-MD5 algorithm for TSIG. As a result, there should not be a finding for the use of HMAC MD5 on BIND servers at this time.

When a future release of BIND supports HMAC-SHA1 (currently BIND 9.4 Beta supports HMAC-SHA1), organizations will be required to migrate to this algorithm and there will be an SRR finding if it is not used.

An example of a properly configured key statement in practice might be:

```
key ns1.kalamazoo.disa.mil_ns2.kalamazoo.disa.mil {
                algorithm hmac-md5;
                include “/etc/dns/keys/ns1_ns2.key”;
        };
```

If the key statement is not configured, then this is a finding.

If the key statement is not configured to implement HMAC-MD5, then this is a finding.

Fix: DNS0705
The DNS software administrator should include the phrase algorithm HMAC-SHA1 or algorithm HMAC-MD5 in each key statement depending upon which is currently available.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0004494

STIG ID: DNS0710

Vulnerability: A TSIG key is not in its own dedicated file with appropriate file permissions.

IA Controls: ECCD-1 Changes to Data
ECSC-1 Security Configuration Compliance

Categories: 2.1 Object Permissions

Severity: Category II

Vulnerability Discussion:
Ideally, nobody even DNS and Systems Administrators should view the key. If it is included in named.conf, they will view it on a regular basis, which means computer forensics is less likely to determine who may have obtained the key if it is compromised. In addition, if the named.conf needs to be copied from the system for whatever reason (e.g., sent to an expert to troubleshoot a problem, appended to a change management work order, etc.), then others will see the key and could copy it. On the other hand, if the key is in a dedicated file, then the operating system can be configured to log any instance when the key is accessed, which would make it easy for security personnel to determine when users other than the DNS name server software performed this function.

Responsibility: System Administrator

References: DNS STIG

Check: DNS0710
The key statement is located in the named.conf. If the key statement includes a secret phrase followed by a character representation of the key, then this is a finding. The correct configuration calls for an include statement embedded in the key statement. The include statement references a separate file that contains the key so it does not need to appear in the named.conf file.

An example of a properly configured key statement in practice might be:

```
key ns1.kalamazoo.disa.mil_ns2.kalamazoo.disa.mil {
                algorithm hmac-md5;
                include “/etc/dns/keys/ns1_ns2.key”;
        };
```

If each key is not located in a dedicated file for each individual key, then this is a finding.

Fix: DNS0710

The DNS software administrator should cut and paste the secret phrase from each key statement and place it in a dedicated file. Then, an include phrase should be added to the key statement.

Additional information on TSIG key generation and storage may be obtained from the DNS STIG.

Create a new designated file for that key

Using a text editor, create a file with the following content:

secret “generated_key”;

In our example, the contents would be:

secret “2njlQNnzn6HTwKLcjStUXg==”;

The syntax of the statement is critical. Ensure that:

- The word “secret” appears at the beginning of the line followed by a space
- The key is included in quotes with no extra spaces before or after the key
- A semi-colon (;) follows the quotation mark after the key
- There are no extra characters, lines, or carriage returns before or after the statement

Importantly, any key longer than approximately 320 bits will contain a space within the key field of the original .key file. This space can be left within the string, as long as it is enclosed within double quotes (") in the new file created to house the key.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0004511

STIG ID: DNS0715

Vulnerability: A BIND name server is not configured to accept control messages only when the control messages are cryptographically authenticated and sent from an explicitly defined list of DNS administrator workstations.

IA Controls: ECCD-1 Changes to Data
ECSC-1 Security Configuration Compliance

Categories: 2.2 Least Privilege

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
The controls statement and the associated use of the rndc or ndc commands introduces the risk that an adversary could use them to remotely control the name server without having to authenticate to the operating system on which the name server resides.

Check: DNS0715
If control messages are utilized, there is to be a properly configured keys statement within the controls statement located in the named.conf.

An example of a properly configured controls statement in practice might be:

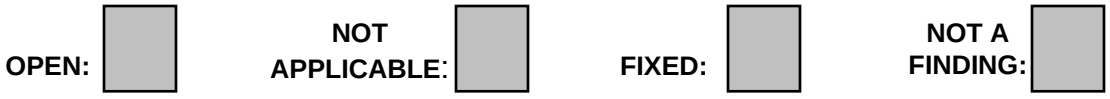
```
controls {
        inet 127.0.0.1
        allow 127.0.0.1
        keys { “rndc_key” };
};
```

If control messages are utilized and not cryptographically authenticated, then this is a finding.

Fix: DNS0715
If control messages are utilized, the DNS software administrator should properly configure the allow and keys phrases within the controls statement located in the named.conf to properly authenticate the control messages.

rndc also has its own configuration file, rndc.conf, that has a similar syntax to the named.conf file, but is limited to the options, key, server, and include statements. An example of a minimal configuration is as follows:

```
key rndc_key {
        algorithm hmac-md5;
        secret "2njlQNnzn6HTwKLcjStUXg==";
};
options {
        default-server localhost;
        default-key rndc_key;
```



Comments:

Vulnerability Key: V0004495

STIG ID: DNS0720

Vulnerability: A unique TSIG key is not utilized for communication between name servers sharing zone information.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 8.4 Key Management

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
If a secret key shared between two servers is not unique, then any breach of the key is not limited to those two servers. In particular, if all servers in a zone share the same key, then there is the possibility that an attack could modify records in all of the servers. Recovering from a successful attack is considerably more difficult in this circumstance. Furthermore, the more copies of any one key are in existence, the greater the likelihood that the confidentiality of that key will be lost at some point in time.

Check: DNS0720
Two name servers sharing zone information must utilize a unique TSIG key for communication between them or, in cases in which more than four servers support a zone, create a written key management plan that will document how keys are shared and replaced in a manner to reduce residual risk to an acceptable level.

If there are no server statements within named.conf, this is a finding. If there are server statements, then check that there is one corresponding to each of the zone partners. If this is not the case, then this is also a finding.

If there are server statements for servers other than those supplied, then there may be a finding associated with the incompleteness of the list.

On the master name server, this is an example of a configured key statement:

```
key ns1.kalamazoo.disa.mil_ns2.kalamazoo.disa.mil. {
algorithm hmac-md5;
include "/etc/dns/keys/tsig-example.key";
};
```

```
zone “disa.mil” {
        type master;
        file “db.disa.mil”;
allow-transfer { key ns1.kalamazoo.disa.mil_ns2.kalamazoo.disa.mil.; };
};
```

On the slave name server, this is an example of a configured key statement:

```
key ns1.kalamazoo.disa.mil_ns2.kalamazoo.disa.mil. {
algorithm hmac-md5;
include "/etc/dns/keys/tsig-example.key";
};

server 10.2.2.2 {
                keys {ns1.kalamazoo.disa.mil_ns2.kalamazoo.disa.mil};
};

zone “disa.mil” {
        type slave;
        masters { 10.1.1.1; };
        file “db.disa.mil”;
};
```

Check the keys phrase within each of the server statements to ensure uniqueness of keys. If two or more server statements reference the same key, then this is a finding.

Fix: DNS0720
The DNS software administrator should modify the named.conf and server statements so that the key shared between any two servers is unique. This may involve the generation of additional keys and the creation of new files dedicated to those keys.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0004497

STIG ID: DNS0730

Vulnerability: The named.conf options statement includes the phrase "fake-iquery yes;".

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

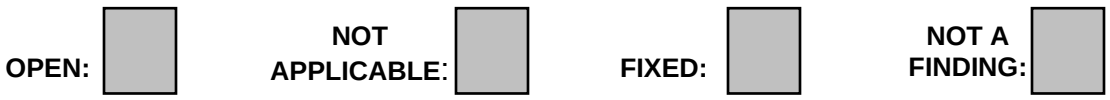
References: DNS STIG

Severity: Category III

Vulnerability Discussion:
In earlier versions of BIND, there is a security vulnerability associated with simulating the obsolete query type IQUERY, which was implemented with the fake-iquery phrase in the options statement.

Check: DNS0730
Review the named.conf file. If the phrase “fake-iquery yes;” appears in the options statement, then this is a finding.

Fix: DNS0730
The DNS software administrator should remove the phrase fake-iquery yes; from the named.conf options statement.



Comments:

Vulnerability Key: V0004499

STIG ID: DNS0735

Vulnerability: The named.conf options statement includes the phrase "rfc2308-type1 yes".

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
A potential vulnerability in DNS is that a name server will provide a list of name servers (i.e., NS records) along with negative responses to queries. Unfortunately, if the query were not sent from a legitimate lost client but an attacker attempting to infiltrate a network, then the name server would provide valuable information to that attacker.

Check: DNS0735
Review the named.conf file. If the phrase “rfc2308-type1 yes” appears in the options statement, then this is a finding.

To ensure that this undesirable behavior is not supported on a given name server, the DNS software administrator must set the option rfc2308-type1 to "no", which is the default behavior in BIND 9.

Fix: DNS0735
The DNS software administrator should remove the phrase "rfc2308-type1 yes" from the named.conf options phrase.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

4.1 BIND on UNIX Only

Vulnerability Key: V0003617

STIG ID: DNS4440

Vulnerability: BIND is not configured to run as a dedicated non-privileged user account. BIND is running as a root user.

IA Controls: ECLP-1 Least Privilege
ECSC-1 Security Configuration Compliance

Categories: 2.2 Least Privilege

Responsibility: System Administrator

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
If an intruder gains control of named (BIND), the intruder will acquire the privileges of the user ID under which it runs. Running as a non-privileged user account limits the extent of any breach. When BIND runs as root (the default) intruders gain full control of the system.

Check: DNS4440
In the presence of the reviewer, the SA should enter the following command:

ps –ef | grep ‘named’ > /etc/dns/srr/bindUser.srr

The user identification (UID) utilized to run named should be found in the results. If the UID is root (i.e., 0) or another built-in ID, then this constitutes a finding. If it is not, then the next step is to check whether the UID is dedicated to this function. The SA should enter the following command, substituting the UID obtained in the previous step for bindUID:

ps –ef | grep ‘bindUID’ > bindUserDaemons.srr

If bindUserDeamons.tmp contains daemons/programs other than BIND (named), then this constitutes a finding. If the dedicated user is associated with named only, the next step is to check whether the user ID has any privileges other than those needed to run BIND. To accomplish this, the SA will check the following:

- Whether the BIND UID is a member of any group other than dnsgroup.
- Whether the BIND UID has permissions to any files other than key files and named.stat.

For the first item, the SA should run the following command (substituting the value for bindUID as appropriate):

grep ‘bindUID’ /etc/group > /etc/dns/srr/bindUserGroups.srr

For the second item, the SA should run the following command (substituting the name of the user ID for dnsuser if applicable):

find / -uid bindUID > /etc/dns/srr/bindUserFiles.srr

With regards to the first item, if dnsuserGroups.srr contains any entry other than dnsgroup (or its equivalent), then this constitutes a finding. With regards to the second item, if dnsuserFilePermissions.srr contains any entries other than the key files and named.stat, then this constitutes a finding.

Fix: DNS4440
The SA should create a new user account dedicated to DNS, configure it per the DNS STIG, and then restart the named process to run as a the new user account.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0012967

STIG ID: DNS4445

Vulnerability: The SA has not configured BIND in a chroot(ed) directory structure.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

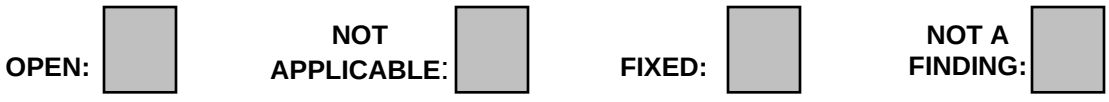
Severity: Category III

Vulnerability Discussion:
With any network service, there is the potential that an attacker can exploit a vulnerability within the program that allows the attacker to gain control of the process and even run system commands with that control. One possible defense against this attack is to limit the software to particular quarantined areas of the file system, memory or both. This effectively restricts the service so that it will not have access to the full file system. If such a defense were in place, then even if an attacker gained control of the process, the attacker would be unable to reach other commands or files on the system. This approach often is referred to as a padded cell, jail, or sandbox. All of these terms allude to the fact that the software is contained in an area where it cannot harm either itself or others. A more technical term is a chroot(ed) directory structure. BIND should be configured to run in a padded cell or chroot(ed) directory structure if supported by the operating system

Check: DNS4445
Review the startup file and make sure the -t option is included:

Edit the startup files to start named with the -t option and option argument: -t /var/named. Similarly to syslogd, many modern versions of UNIX start named from /etc/rc.d/init.d/named.

Fix: DNS4445
The SA will ensure BIND is configured in a chroot(ed) directory structure.



Comments:

Vulnerability Key: V0003618

STIG ID: DNS4450

Vulnerability: A UNIX or UNIX-based name server is running unnecessary daemon/services and/or is configured to start an unnecessary daemon, service, or program upon boot up.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 14.4 Unneeded Ports, Protocols, Hardware, and Services

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
Unnecessary software running on a name server could introduce security vulnerabilities that would be avoided if it were not present.

Check: DNS4450
The reviewer should examine the start-up files to determine whether they launch unnecessary programs. The file /etc/inetd.conf is common to UNIX implementations. The reviewer may use the cat command to view this file. If the file contains any of the daemons listed, this is a finding:

If SNMP is used for network management it must be documented and configured in accordance with the UNIX STIG.

Below is a list of prohibited services. If any of these processes are running (the reviewer may use the ps –ef | grep service name to verify if the process is running or not), or configured to be started upon boot-up (the reviewer may use the ls command in the /etc/rc2.d or /etc/rc3.d directory), then this is a finding (although inherently dangerous, if SNMP is used for network management purposes, it must be documented and configured in accordance with the UNIX STIG):

- NFS client (s73nfs.client in rc2.d)
- automounter (s74autofs in rc2.d)
- printer queue daemon (s80lp in rc2.d)
- RPC portmapper (s71rpc in rc2.d)
- CDE login (s99dtlogin in rc2.d)
- NFS server process (s15nfs.server in rc3.d)
- SNMP daemon (s76snmpdx in rc3.d)

Mitigation:

If SNMP is used for network management it must be documented and configured in accordance with the UNIX STIG. SNMP is not a finding if operationally necessary and documented as such.

Fix: DNS4450
The SA should edit startup files (e.g., inetd.conf) so that the unnecessary programs to not launch on boot-up.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0003619

STIG ID: DNS4460

Vulnerability: It is possible to obtain a command shell by logging on to the DNS user account.

IA Controls: ECSC-1 Security Configuration Compliance
ECLP-1 Least Privilege

Categories: 2.2 Least Privilege

Responsibility: System Administrator

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
If an intruder gains access to a command shell, the intruder may be able to execute unauthorized commands.

Check: DNS4460
The SA should enter the following command (this command assumes that named is running as user dnsuser):

grep dnsuser /etc/passwd

Based on the command output, the reviewer can identify whether a shell exists for dnsuser. The shell should be /dev/null or /bin/false. If it is a legitimate shell, then this is a finding.

Fix: DNS4460
The SA should edit /etc/passwd and change the shell of the DNS user account to /bin/false, /dev/null, or an alternative producing a similar effect.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0003620

STIG ID: DNS4470

Vulnerability: Permissions on critical UNIX name server files are not as restrictive as required.

IA Controls: ECCD-1 Changes to Data
ECLP-1 Least Privilege
ECSC-1 Security Configuration Compliance

Categories: 2.1 Object Permissions

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
Weak permissions could allow an intruder to view or modify zone, configuration and/or program files.

Check: DNS4470
Using the ls –l command from the directory containing the core BIND files, check that the permissions for the files listed are at least as restrictive as those listed:

FILE NAME	*OWNER*	*GROUP*	*PERMISSIONS*
named.conf	*root*	*dnsgroup*	*640*
named.pid	*root*	*dnsgroup*	*600*
Root hints file	*root*	*dnsgroup*	*640*
master zone file	*root*	*dnsgroup*	*640*
slave zone file	*root*	*dnsgroup*	*660*

The name of the root hints file is defined in named.conf. Common names for the file are root.hints, named.cache, or db.cache.

Fix: DNS4470
The SA should modify permissions so that they are at least as restrictive as specified in the DNS STIG.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0012966

STIG ID: DNS4480

Vulnerability: Inadequate file permissions on BIND name servers.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 2.1 Object Permissions

Responsibility: System Administrator

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
Weak permissions could allow an intruder to view or modify zone, configuration and/or program files.

Check: DNS4480
On BIND 8 name servers, the following permissions must be set:

FILE NAME	*OWNER*	*GROUP*	*PERMISSIONS*
named.run	*root*	*dnsgroup*	*660*
named_dump.db	*root*	*dnsgroup*	*660*
ndc (FIFO)	*root*	*dnsgroup*	*600*
ndc.d (directory containing ndc)	*root*	*dnsgroup*	*700*

The following must be set on log files:

FILE NAME	*OWNER*	*GROUP*	*PERMISSIONS*
unique to each key	*dnsuser*	*dnsgroup*	*400*

The following must be set on TSIG keys:

FILE NAME	*OWNER*	*GROUP*	*PERMISSIONS*
any log file	*dnsuser*	*dnsgroup*	*660*

Fix: DNS4480
The SA will ensure that the file permissions on BIND 8 files as well as the log and TSIG key files are set in accordance with the DNS STIG requirements.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

4.2 BIND on Windows Only

Vulnerability Key: V0003621

STIG ID: DNS4530

Vulnerability: ISC BIND is not configured to run as a dedicated non-privileged service user account.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

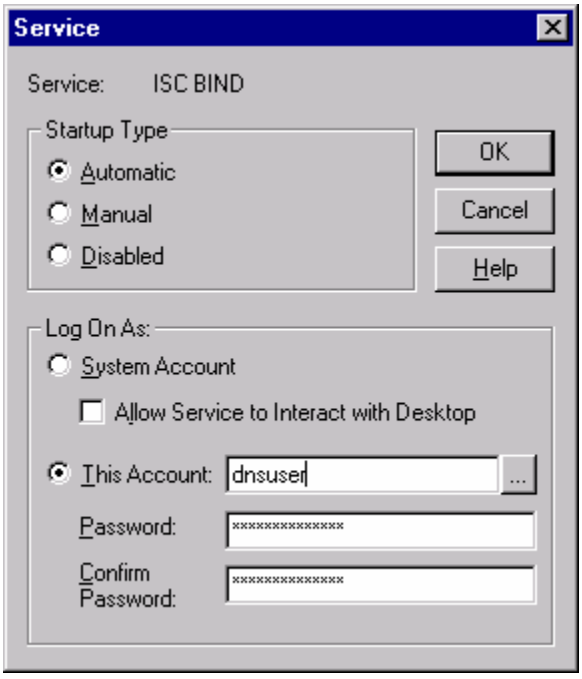
Responsibility: System Administrator

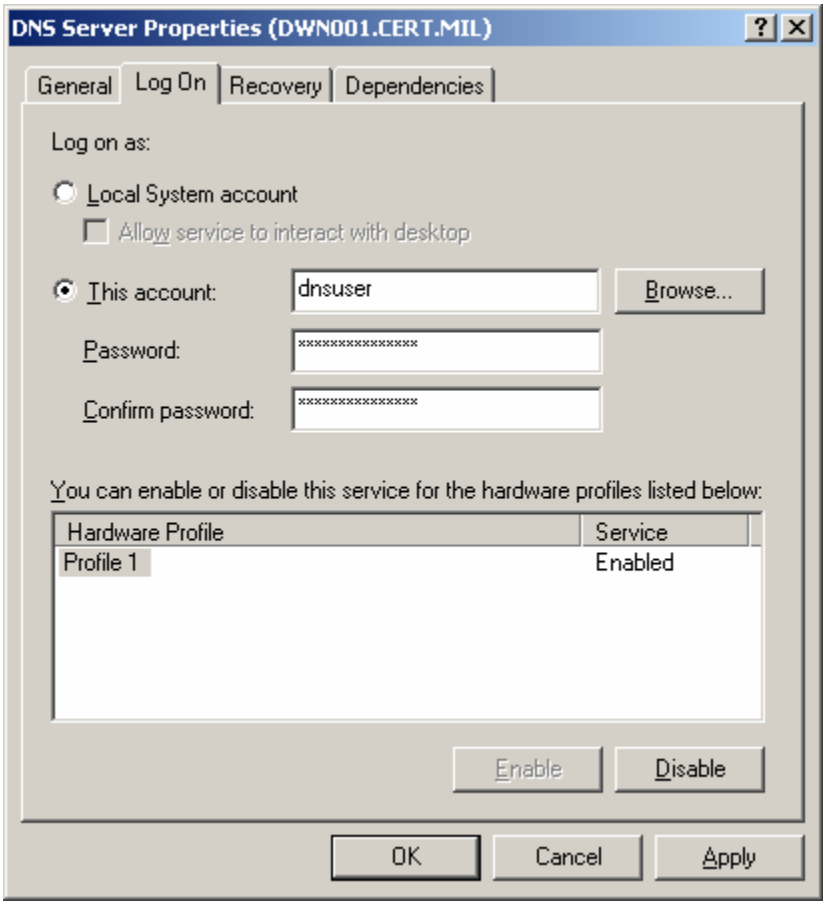
References: DNS STIG

Severity: Category II

Vulnerability Discussion:
If an intruder gains control of named (BIND), then the intruder will acquire the privileges of the user ID under which it runs. Running as a non-privileged user account limits the extent of any breach. When BIND runs as SYSTEM (the default) intruders gain full control of the system.

Check: DNS4530
The reviewer will validate ISC BIND is configured to run as a dedicated non-privileged service user account. Select the "Log On" tab of the properties of the ISC BIND service. If the ISC BIND service logs on as the "Local System account", then this is a finding.


Service
Service: ISC BIND
Startup Type
Automatic
Manual
Disabled
OK
Cancel
Help
Log On As:
System Account
Allow Service to Interact with Desktop
This Account: dnsuser
Password:
Confirm Password:


DNS Server Properties (DWN001.CERT.MIL)
General
Log On
Recovery
Dependencies
Log on as:
Local System account
Allow service to interact with desktop
This account: dnsuser
Browse...
Password:
Confirm password:
You can enable or disable this service for the hardware profiles listed below:
Hardware Profile
Service
Profile 1
Enabled
Enable
Disable
OK
Cancel
Apply

Fix: DNS4530
The SA should create a new user account dedicated to DNS, configure it per the DNS STIG, configure the ISC BIND service to logon as the new user account, and then restart the ISC BIND Service.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0003622

STIG ID: DNS4540

Vulnerability: The ISC BIND service user is a member of a group other than Everyone and Authenticated Users.

IA Controls: ECCD-1 Changes to Data
ECCD-2 Changes to Data
ECSC-1 Security Configuration Compliance

Categories: 2.2 Least Privilege

Responsibility: System Administrator

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
Membership in configurable groups gives the BIND service user unnecessary privileges that could be used by an intruder to further breach name server security.

Check: DNS4540
In Windows 2000/2003, select System Tools | Users and Groups | Users in the "Computer Management" tool. View the "Member Of" tab in the "User Properties" dialog Box (which can be accessed by double-clicking on the user). If the user is a member of any group besides "everyone" and "Authenticated Users", then this is a finding.

In Windows, a user does not have to be a member of any group other than the implicit groups "Everyone" and "Authenticated Users." Thus, to best ensure security, dnsuser must be removed from all explicit groups, including the "Users" group, into which all users are placed by default. There should not be a dnsgroup group as is recommended for UNIX.

Fix: DNS4540
The SA should remove the BIND service user account from all configurable user groups.

Comments:

Vulnerability Key: V0003623

STIG ID: DNS4550

Vulnerability: The ISC BIND service does not have the appropriate user rights required for the proper configuration and security of ISC BIND.

IA Controls: ECLP-1 Least Privilege
ECSC-1 Security Configuration Compliance

Categories: 2.2 Least Privilege

Responsibility: System Administrator

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
Having user rights beyond the minimum necessary gives the BIND service user unnecessary privileges that could be used by an intruder to further breach name server security.

Check: DNS4550

Windows 2000 adds several relevant user rights (actually user prohibitions). In "Local Security Settings" (a Microsoft Management Console Plug in), select Local Policies | User Rights Assignments in the left windowpane. By looking at the assignments in the right windowpane, check that the DNS user account is not listed under any assignments other than "Log on as a service," "Deny access to this computer from the network," and "Deny logon as batch job." If the user has any additional rights beyond these, this is a finding.

Fix: DNS4550
The SA should grant the ISC BIND service the user rights of log on as service, Deny Access to This Computer from the Network, and Deny Logon as a Batch Job, which are required for the proper configuration and security of ISC BIND.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0003624

STIG ID: DNS4570

Vulnerability: The appropriate encryption software is not correctly installed and configured on Windows ISC BIND name servers and it is required that in-band remote management be performed from hosts outside the enclave in which the name server resides.

IA Controls: DCNR-1 Non-repudiation
ECSC-1 Security Configuration Compliance

Categories: 8.1 Encrypted Data in Transit

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
If administrative network traffic is in the clear between external clients and name servers, then there is significant potential that authorized individuals can intercept and view that traffic, which may contain passwords and other sensitive information.

Check: DNS4570
The Systems Administrator may state that the evaluated Windows BIND name server is administered from a host outside of the internal network (e.g., a home office or remote site). In this case, there must be appropriate software on the Windows BIND name server to support encrypted communication. Once the service has been identified, the reviewer should check that the software does require encrypted sessions and authentication. Additional checks from the Secure Remote Computing STIG may apply. If the reviewer determines that the installed remote access/control configuration is inadequate, then there should be a finding with a written explanation specifying why the configuration is inadequate.

Fix: DNS4570
The IAO should prohibit in-band remote management until an appropriate network encryption solution has been deployed and tested.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0003626

STIG ID: DNS4590

Vulnerability: The ownership and permissions on all Windows ISC BIND name servers are not as restrictive as required.

IA Controls: ECLP-1 Least Privilege
ECSC-1 Security Configuration Compliance

Categories: 2.2 Least Privilege

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
Weak permissions could allow an intruder to view or modify zone, configuration and/or program files.

Check: DNS4590

The reviewer can check permissions and ownership by looking at the properties of each file in "Windows Explorer."

Note that there may be multiple zone files, key files, and log files. The reviewer should be able to produce a list of the files based on a quick examination of named.conf, which should have been obtained at the beginning of this module. The reviewer should check the permissions of each zone, key or log file when more than one exists on the name server.

The name of the root hints file is defined in named.conf. Common names for the root hints file are root.hints, named.cache, and db.cache.

FOLDER/FILE NAME	*OWNER*	*USER/GROUP*	*PERMISSIONS*
%systemroot%\system32\dns\bin	*Administrators*	*Administrators*	*Full control*
		dns-admins	*Read*
		dnsuser	*Read*
%systemroot%\system32\dns\etc	*Administrators*	*Administrators*	*Full control*
		dns-admins	*Change*
		dnsuser	*Change*
named.conf	*Administrators*	*Administrators*	*Full control*
		dns-admins	*Change*
		dnsuser	*Read*
named.pid	*Administrators*	*Administrators*	*Full control*
		dns-admins	*Read*
		dnsuser	*Change*
named.stat	*Administrators*	*Administrators*	*Full control*
		dns-admins	*Read*
		dnsuser	*Change*
root hints file	*Administrators*	*Administrators*	*Full control*
		dns-admins	*Change*
		dnsuser	*Read*
Any zone file	*Administrators*	*Administrators*	*Full control*
		dns-admins	*Change*
		dnsuser	*Change*
Any TSIG key file	*Administrators*	*dnsuser*	*Read*

If permissions are more permissive than required, then this is a finding.

Fix: DNS4590
The SA should modify permissions so that they are at least as restrictive as specified in the DNS STIG.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

5. WINDOWS DNS

Vulnerability Key: V0012945

STIG ID: DNS0255

Vulnerability: The SA has not disabled DHCP on a Windows Domain Controller.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
The default Windows configuration of the DHCP service, where the service runs using the computer account of the local Windows Domain Controller, poses a significant potential vulnerability. This computer account has full control over all DNS objects stored in Active Directory. In this case the DHCP server has access to modify the SRV (and other) records for all the Domain Controllers. When these records are replicated to other domain controllers (when AD Integrated DNS is used as required by the STIG), all the Windows DNS servers could potentially be compromised.

Check: DNS0255
Work with the administrator to determine if the host is obtaining a DHCP address on a Windows Domain Controller.

Under Control Panel, Network Connections (depending on how many connections the machine has), select Local Area Network Connections (LAN), select properties, Internet Protocol (IP), and properties. If the radio button "Obtain an IP address automatically" is selected, this is a finding.

Fix: DNS0255
Assign the DNS server a static IP address. DHCP should not be used to assign an IP address to a Windows Domain Controller.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0012479

STIG ID: DNS0260

Vulnerability: Computer accounts for DHCP servers are members of the DNSUpdateProxy group.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
A built-in security group, DNSUpdateProxy, is provided as of Windows 2000. This group can update DNS records for clients without becoming the owner of the records. When DHCP servers are added as members of this group, any of the (member) DHCP servers can update the records. The first user that is not a member of the DNSUpdateProxy group to modify the records associated with a client; becomes the owner. There is a vulnerability for all servers (even non-domain controllers) on which a DHCP service runs. The DNS records associated with the DHCP server host could be modified by other DHCP servers that are members of the DNSUpdateProxy group. In order to prevent this from occurring, DHCP should not be installed on a domain controller if the group DNSUpdateProxy is utilized.

Check: DNS0260
Review the membership of the DNSUpdateProxy group to determine if any of the computer accounts are DHCP servers. If there are any computer accounts for DHCP servers, this is a finding.

View Computer Management, Local Users and Groups, Groups. Review the membership of the DNSUpdateProxy group to determine if any of the accounts are DHCP servers.

Fix: DNS0260
The IAO will ensure computer accounts for DHCP servers are not members of the DNSUpdateProxy group.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0004500

STIG ID: DNS0800

Vulnerability: The firewall rules or router ACLs do not prevent unauthorized hosts from outside the enclave from querying internal Windows DNS servers.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

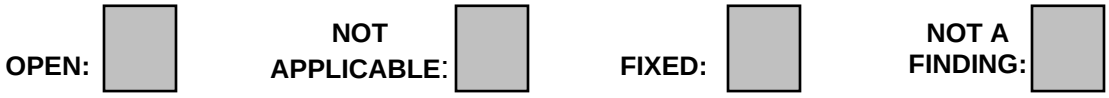
References: DNS STIG

Severity: Category II

Vulnerability Discussion:
Windows DNS name servers should support internal hosts only because they do not have some of the critical access control capabilities included in BIND. If external hosts can reach a name server that hosts internal names only, then there is the potential that an external adversary can obtain information about internal hosts that could assist the adversary in a network attack. External hosts should never be able to learn about the internal network in this manner. Windows DNS cannot restrict transactions other than zone transfers by IP address. Instead, organizations must use firewalls or router ACLs to enforce those restrictions. These additional protections are typically a component of defense-in-depth security architecture, but in this case they comprise the first and likely only line of defense against unauthorized access to zone records.

Check: DNS0800
If there is access to a Windows DNS server from outside of the enclave, then this is a finding. Work with the Network Reviewer to determine if TCP/UDP port 53 is allowed inbound to the internal DNS server.

Fix: DNS0800
Working with appropriate technical personnel, the IAO should establish firewall rules and/or router ACLs that prohibit access to the name server from external hosts.



Comments:

Vulnerability Key: V0004501

STIG ID: DNS0805

Vulnerability: The DHCP server service is not disabled on any Windows 2000/2003 DNS server that supports dynamic updates.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category I

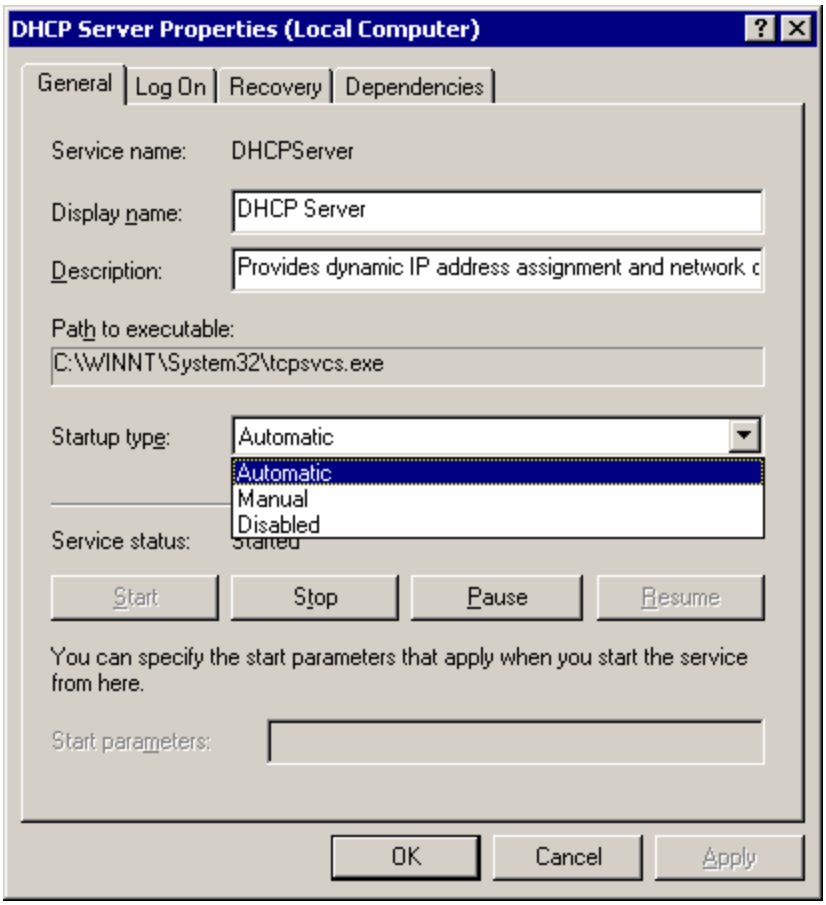
Vulnerability Discussion:
There is a significant vulnerability potential when the DHCP service runs using the computer account of a Windows Domain Controller, as in the default Windows configuration. This account has full control over all DNS objects stored in Active Directory. In this case, the DHCP server has access to modify the SRV (and other) records for all the Domain Controllers. When these records were replicated to other domain controllers (when AD Integrated DNS is used as required by the STIG), all the Windows DNS servers could potentially be compromised.

Check: DNS0805
Log in to the server with an account that has admin rights. Right-click "My Computer" on the desktop and click "Manage." This brings up the "Computer Management" tool.

Click the plus sign next to "Services and Applications" on the left pane to expand it. Select "Services" on the left panel.

On the right pane, scroll down and select "DHCP Server." Right-click "DHCP Server" and click "Properties." This brings up the "DCHP Server Properties".

The reviewer will validate the DHCP server service is disabled. The "Disabled" drop down selection is to be selected on the "General" tab of the "DHCP Server Properties." If the DHCP server service is not disabled, then this is a finding.



Fix: DNS0805
Working with appropriate SA and technical personnel, the IAO should plan to migrate the DHCP service to another machine as soon as it is feasible to do so.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0004502

STIG ID: DNS0810

Vulnerability: Zone transfers are not prohibited or a VPN solution is not implemented that requires cryptographic authentication of communicating devices and is used exclusively by name servers authoritative for the zone.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

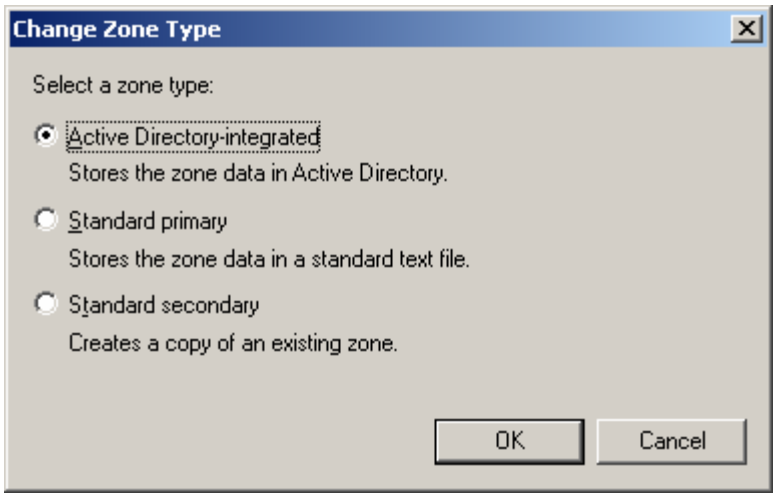
Severity: Category I

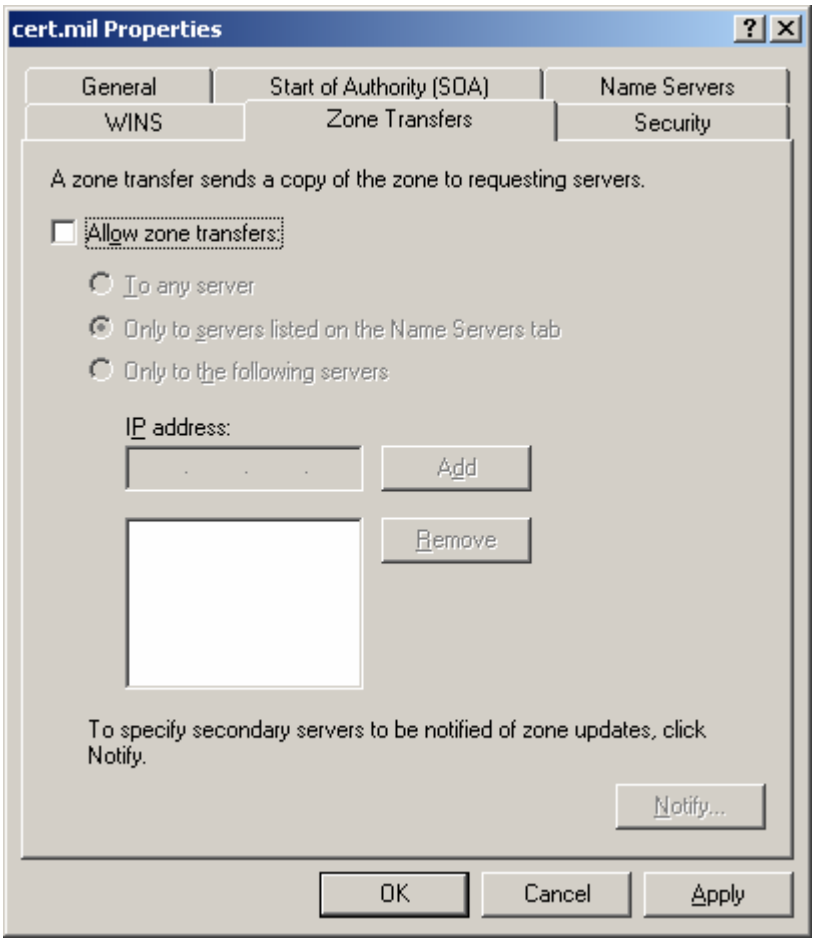
Vulnerability Discussion:
If zone transfers are not cryptographically authenticated, then there is the potential for an adversary to masquerade as a legitimate zone partner and update zone records without authorization.

Check: DNS0810
The reviewer will validate zone transfers are prohibited. The reviewer will ensure the "Allow zone transfers" check box is not selected on the “Zone Transfers” tab of the name server properties.

If zone transfers are allowed, then this is a finding.

Windows allows for two ways of synchronizing zone data across name servers: (1) traditional RFC-compliant DNS zone transfers; and (2) AD-replication. The latter only works when Windows DNS is integrated with AD, which makes each of the DNS records an AD object. The Windows 2000/2003 DNS implementation of traditional zone transfers does not meet the STIG requirement that the transfers be cryptographically authenticated using a technology such as TSIG. Fortunately, AD-replication is cryptographically authenticated. Therefore, the solution in a pure Windows 2000/2003 DNS implementation is to integrate DNS with AD and disable zone transfers.





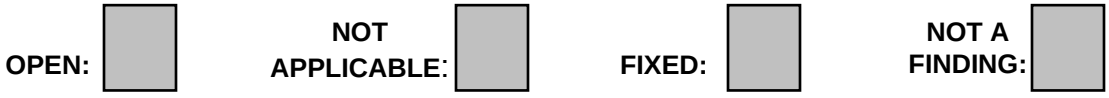
Mitigation:
All of the following must apply:

- All DNS servers are in a secured Enclave with all appropriate network infrastructure protections and communicate strictly behind the perimeter, or on a non-contiguous network where the public links between site segments are protected with site-to-site VPNs

- Such network is completely controlled by the server owner
- Access to the network is protected IAW the network infrastructure STIG
- Access to the DNS servers and resources is limited to members and servers of the DNS server owner's organization

If all of the aforementioned requirements are met, this finding can be downgraded to a CAT II.

Fix: DNS0810
Working with relevant DNS administrators, the SA should configure Windows DNS to rely on Active Directory to replicate zone data whenever possible. If this is not feasible, then the SA must establish an IPSEC VPN between relevant zone partners or implement a satisfactory alternative encryption-based authentication technology.



Comments:

Vulnerability Key: V0004503

STIG ID: DNS0815

Vulnerability: Forwarders on an authoritative Windows 2000/2003 DNS server are not disabled.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

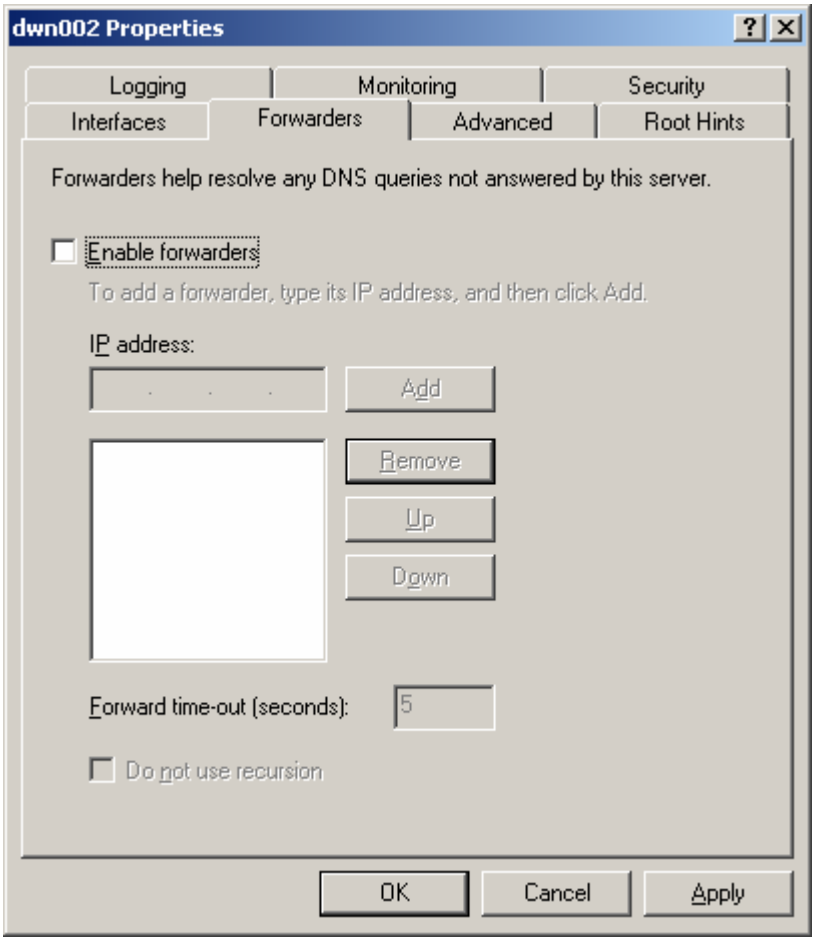
Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
Windows DNS has historically been more vulnerable to cache poisoning attacks than BIND. The algorithm used for answering recursive queries also makes it more prone to self-imposed denial of service attacks and as an amplification device for attacks on other DNS servers. Additionally, Windows DNS does not allow for the fine-grained access control restrictions (i.e., limiting the clients that are able to perform recursion) that are allowed by BIND and other recursive DNS appliances. Therefore, Windows 2000/2003 DNS should not be deployed as a caching name server. Consequently, the use of forwarders and recursion is prohibited on Windows 2000/2003 DNS servers.

Check: DNS0815
Windows DNS should not be deployed as a caching name server. Consequently, the use of forwarders and recursion is prohibited on Windows 2000/2003 DNS. The reviewer will validate that the "Enable Forwarders" check box is not selected on the “Forwarders” tab of the name server properties.



If forwarders are enabled, then this is a finding.

Fix: DNS0815
The SA should disable forwarding (on the Forwarders tab of the name servers properties dialog box).

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0004504

STIG ID: DNS0820

Vulnerability: Recursion on an authoritative Windows DNS server is not disabled.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

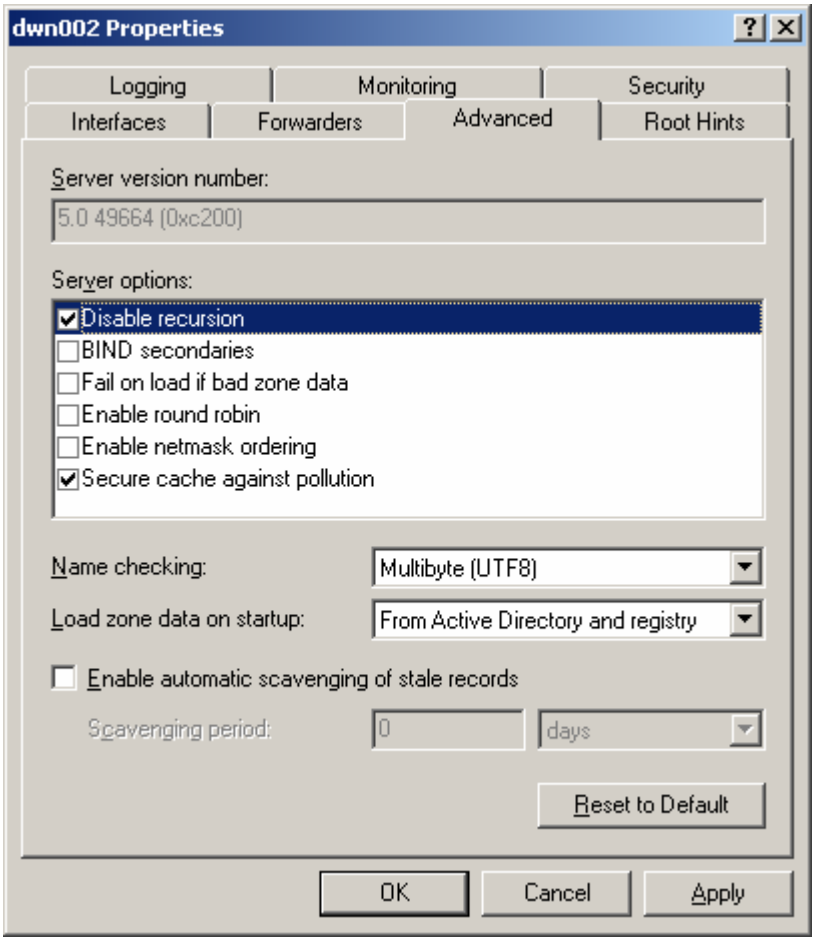
Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
Windows 2000/2003 DNS should be utilized as an authoritative name server only. If recursion is enabled, then there is the potential for cache poisoning.

Check: DNS0820
Windows DNS server should not be deployed as a caching name server. Consequently, the use of forwarders and recursion is prohibited on Windows 2000/2003 DNS. The reviewer will validate that the "Disable recursion" and the “Secure cache against pollution" on the “Advanced” tab of the name server properties are selected.



If recursion is not disabled, then this is a finding.

Fix: DNS0820

The SA should disable recursion by selecting Disable recursion and Secure cache against pollution on the Advanced tab of the name server properties dialog box.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0004505

STIG ID: DNS0825

Vulnerability: WINS lookups is not prohibited on a Windows 2000 DNS server.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

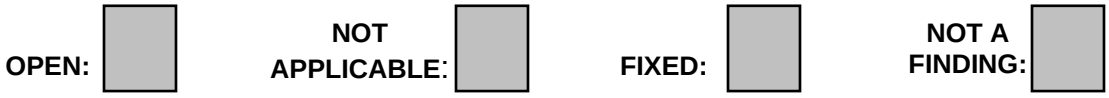
Severity: Category I

Vulnerability Discussion:
Integration of WINS and Windows 2000 DNS leaves Windows 2000 DNS open to all the vulnerabilities of WINS, including the ability to update records without authentication.

Check: DNS0825
The reviewer will validate the "Use WINS forward lookup" is not checked on the “WINS” tab on the properties dialog of each zone.

If WINS is integrated on a Windows 2000 DNS server, then this is a finding.

Fix: DNS0825
The SA should disable any integration between DNS and WINS as soon as it feasible to do so. If WINS is required for legacy applications, then DNS clients will need to be reconfigured to use WINS rather than DNS for NetBIOS name resolution. The SA should uncheck Use WINS forward lookup on the WINS tab on the properties dialog of each zone.



Comments:

Vulnerability Key: V0003625

STIG ID: DNS4580

Vulnerability: Shares other than the default administrative shares are enabled on a name server.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 2.2 Least Privilege

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
Non-administrative shares are unnecessary for name server operation and provide adversaries with an additional possible point of attack.

Check: DNS4580
From a command prompt, type net view \\127.0.0.1 and press enter. If any shares appear other than default administrative shares (e.g., C$, NETLOGON$), then this is a finding

Fix: DNS4580
The SA should disable all non-administrative shares.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

6. CISCO CONTENT SWITCH

Vulnerability Key: V0004506

STIG ID: DNS0900

Vulnerability: The shared secret in the APP session(s) was not a randomly generated 32 character text string.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 8.4 Key Management

Responsibility: System Administrator

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
The core requirements related to zone transfers are that an authoritative name server transfers zone information only to designated zone partners and that name servers only accept zone data when it is cryptographically authenticated. CSS APP provides means to designate with which devices it can share zone data and to authenticate those transactions. CSS devices can define their peers using IP addresses and authenticate them using Challenge Handshake Authentication Protocol (CHAP) with a shared secret. This setup also can be supplemented with MD5 hashing encryption. While this configuration does not provide the equivalent strength of cryptographic authentication as BINDs TSIG HMAC-MD5, it does provide a satisfactory level of information assurance when CSS DNS operates within a trusted network environment.

Check: DNS0900
Interview the SA and determine if the key was a randomly generated 32-character text string.

Fix: DNS0900
The CSS DNS administrator should use the following command while in global command mode; app session ip_address authChallenge shared_secret encryptMd5hash. In this command, ip_address refers to the IP address of the designated peer and the shared_secret is a text string up to 32 characters in length.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0004507

STIG ID: DNS0905

Vulnerability: The Cisco CSS DNS is utilized to host the organizations authoritative records and DISA Computing Services does not support that host in its csd.disa.mil domain and associated high-availability server infrastructure.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
The primary security concern with regard to the type of delegation discussed is that to implement this approach, an organization would have to migrate its authoritative records from a well-known DNS implementation with proven, tested security controls to a relatively new DNS implementation without similar controls. Therefore, this migration should only occur when the performance and availability advantages of CSS significantly outweigh the increased residual security risk of using a less mature technology.

Check: DNS905
Determine whether the CSS DNS device is used as an authoritative name server. If the CSS DNS does maintain authoritative records, then this is a finding. The exception to this is if this CSS DNS device supports authoritative records for a host(s) within the csd.disa.mil domain, which is not a finding.

Instruction: In the presence of the reviewer, the CSS DNS administrator should enter the following command while in global configuration mode:

show dns-record statistics
If any of the hosts have domain names outside of the csd.disa.mil domain, then this is a finding.

Fix: DNS0905
The CSS DSN administrator should use the following command while in global command mode; no dns-record, to remove domain records that do not support hosts in the csd.disa.mil domain.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐
Comments:

Vulnerability Key: V0004508

STIG ID: DNS0910

Vulnerability: Zones are delegated with the CSS DNS.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: Information Assurance Officer

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
Although it is technically possible to delegate zones within CSS DNS, there is almost never a rationale to do so because such delegation could be achieved as easily with BIND, which offers security features not present in CSS DNS. Moreover, the performance enhancing features of CSS typically would not apply to name server records because these records are obtained easily and quickly across the wide area without significant impact on a users experience

Check: DNS910
In the presence of the reviewer, the CSS DNS administrator should enter the following command while in global configuration mode:

show dns-record statistics

There should be no DNS record types of NS. If there are NS records, then this is a finding.

Fix: DNS0910
The CSS DNS administrator should remove any NS records with the following command while in global configuration mode; no dns-record ns domain_name.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0004512

STIG ID: DNS0915

Vulnerability: CSS DNS does not cryptographically authenticate APP sessions.

IA Controls: DCNR-1 Non-repudiation
ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category I

Vulnerability Discussion:
The risk to the CSS DNS in this situation is that the CSS DNS peers do not authenticate each other, the sending and receiving of APP session data and peer communication may be with an adversary rather than the intended peer, thereby sending sensitive network architecture data and receiving ill intended zone data. To protect against this possibility, the CSS DNS peers must cryptographically authenticate each other.

Check: DNS0915
In the presence of the reviewer, the CSS DNS administrator should enter the following command while in global configuration mode:

show app session

Confirm the authentication type is set to “authChallenge” and the encryption type is set to “encryptMd5hash.” This will confirm APP CHAP authentication and MD5 hashing features for APP sessions are configured between peers, if this is not the case, then this is a finding. The only exception would be if the CSS DNS administrator uses an IPSEC VPN between each peer couple. Review the IPSEC VPN with the CSS DNS administrator and validate the IPSEC VPN is configured between peers, if this is not the case, then this is a finding.

Fix: DNS0915
The command, show app session, displays that the authentication type is not set to authChallenge and the encryption type is not set to encryptMd5hash.

Comments:

Vulnerability Key: V0004509

STIG ID: DNS0920

Vulnerability: The CSS DNS does not transmit APP session data over an out-of-band network if one is available.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
One can also limit APP communication to an out of band network, which would make it considerably more difficult for adversaries to spoof the addresses of peers or hijack APP sessions.

Check: DNS0920
In the presence of the reviewer, the CSS DNS administrator should enter the following command while in global configuration mode:

show app session

Instruction: Ensure Application Peering Protocol (APP) session data is not sent over an out-of-band network. If APP session data is sent over an out-of-band network, then this is a finding.

Fix: DNS0920
The CSS DNS administrator should use the following command while in global configuration mode; app session 1.2.3.4 (sample IP address), to configure CSS to only transmit session data over an out-of-band network, if one is available.

OPEN:		NOT APPLICABLE:		FIXED:		NOT A FINDING:	

Comments:

Vulnerability Key: V0004510

STIG ID: DNS0925

Vulnerability: Forwarders are not disabled on the CSS DNS.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category II

Vulnerability Discussion:
CSS DNS is not vulnerable to attacks associated with recursion because it does not support recursion, but does offer a forwarder feature that sends un-resolvable or unsupported requests to another name server. This feature poses a risk because the forwarder feature merely redirects potential attacks to another name server.

Check: DNS0925
In the presence of the reviewer, the CSS DNS administrator should enter the following command while in global configuration mode:

show dns-server forwarder

Confirm the DNS server forwarder primary and DNS server forwarder secondary are "Not Configured." If either of these is configured, then this is a finding.

Fix: DNS0925
The CSS DNS administrator should disable forwarders by entering the following command while in global configuration mode: no dns-server forwarder primary (if a primary) or no dns-server forwarder secondary (if a secondary).

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

Vulnerability Key: V0004467

STIG ID: DNS0225

Vulnerability: Record owners will validate their zones no less than annually. The DNS database administrator will remove all zone records that have not been validated in over a year.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: Information Assurance Officer

References: DNS STIG

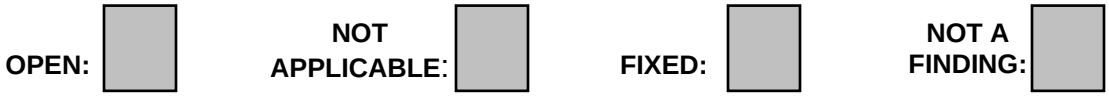
Severity: Category III

Vulnerability Discussion:
If zone information has not been validated in over a year, then there is no assurance that it is still valid. If invalid records are in a zone, then an adversary could potentially use their existence for improper purposes. An SOP detailing this process can resolve this requirement.

Check: DNS0225
The reviewer should check that the record's last verified date is less than one year prior to the date of the review. If this is not the case for any host or group of hosts, then this is a finding.

Fix: DNS0225
Working with DNS Administrators and other appropriate technical personnel, the IAO should attempt to validate the hosts with expired validation dates. If these cannot be validated within a reasonable period of time, they should be removed.

A zone file should contain adequate documentation that would allow an IAO or newly assigned administrator to quickly learn the scope and structure of that zone. In particular, each record (or related set of records, such as a group of LAN workstations) should be accompanied by a notation of the date the record was created, modified, or validated and record the owner's name, title, and organizational affiliation. The owner of a record is an individual with the authority to request that the record be modified or deleted.



Comments:

Vulnerability Key: V0004469

STIG ID: DNS0235

Vulnerability: Zone-spanning CNAME records, that point to a zone with lesser security, are active for more than six months.

IA Controls: ECSC-1 Security Configuration Compliance

Categories: 4.6 DNS

Responsibility: System Administrator

References: DNS STIG

Severity: Category III

Vulnerability Discussion:
The use of CNAME records for exercises, tests or zone-spanning aliases should be temporary (e.g., to facilitate a migration). When a host name is an alias for a record in another zone, an adversary has two points of attack the zone in which the alias is defined and the zone authoritative for the aliases canonical name. This configuration also reduces the speed of client resolution because it requires a second lookup after obtaining the canonical name. Furthermore, in the case of an authoritative name server, this information is promulgated throughout the enterprise to caching servers and thus compounding the vulnerability.

Check: DNSS0235
Review the zone files and the DNS zone record documentation and confirm that there are no CNAME records older than 6 months. If there are CNAME records older than 6 months, then this is a finding.

Fix: DNS0235
The DNS database administrator should remove any zone-spanning CNAME records that have been active for more than six months.

OPEN: ☐ **NOT APPLICABLE:** ☐ **FIXED:** ☐ **NOT A FINDING:** ☐

Comments:

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